Perfect Flow with Rexroth. Solutions for the Food and Packaging Industries

Beverages and Liquid Food
From a Basic Necessity to a Lifestyle Product

Beverages and liquid food have long been required to do more than just quench thirst or even just taste good. By their image or ingredients, they promote consumers’ wellness and self-esteem. Other products serve as a symbol of belonging to “in groups”, similar to fashion cycles. This shortens the product lifecycle, and a wide variety of seasonal beverages or individually packaged products compete constantly for consumers’ attention.

However, the packaging must also fulfill additional functions. The tamper-evident closure gives consumers the assurance of purchasing an absolutely safe product. At the same time, the increasingly light packages must be reclosable, as more and more people consume beverages and liquid food while on the run or on the road.

For consumer goods with a lifestyle character, consumers’ identification with the brand plays an increasingly important role. To protect this important brand capital, manufacturers introduce state-of-the-art quality assurance methods. This increases sanitary, hygiene and product safety requirements even further.

Above all, consumers’ desire for food produced in an environmental responsibility drives trends in all markets: organic products are constantly gaining market share. Recyclable packages, new materials and energy-efficient production facilities underscore manufacturers’ commitment to sustainable production methods.

I am what I eat and drink – this attitude defines the consumption habits of an increasing number of consumers worldwide. One consequence: significantly shorter product life cycles and more elaborate packaging.
Full Speed and More

Megatrends in consumer behavior have a direct effect on the production and packaging of beverages and liquid food. This places stringent demands on automation.

**Speed**: Minimum cycle times for filling, closing, labeling and applying outer packaging: only with smooth interaction of all modules of a filling line at maximum speed can optimal output be attained.

**System availability**: The numerous linked process steps leading up to the ready-to-ship pallet require maximum reliability from all system parts. The failure of an individual station often means the loss of valuable production time for the entire system.

**Openness**: Internationally accepted communication standards and programming languages ensure transparent data flow throughout the entire system. Automation products with open interfaces have proven themselves to offer greater efficiency, availability and simplicity of use, and are becoming increasingly popular in open competition.

**Versatility**: Fast change of product, quantity and size, immediate reaction to increasing or decreasing consumer demand – with the same high level of productivity – can be provided only by highly versatile system designs.
**Filling process:** Safe filling requires the highest sanitary and hygiene standards, possibly even aseptic processes. All components that come into contact with the actual product in the wet area must meet the most stringent requirements for cleanability.

**Energy efficiency:** At least the same productivity with lower energy consumption: with efficiency-optimized drive solutions, proper sizing for the application, intelligent closed-loop control systems and the recovery of brake energy, machine manufacturers can significantly improve energy efficiency with immediate effect.

**Safety technology:** Intelligent safety concepts allow manual intervention into individual stations without the need to shut down the entire system or machine.
High-output blow molding machines manufacture PET bottles at maximum speed and feed them into the process. This requires customized, reliable automation concepts that stretch the preforms at lightning speed. Rexroth is the only manufacturer to offer a choice between pneumatic stretching cylinder units and electromechanical solutions as ready-to-install modules. In these modules, the perfectly matched components execute the cycle.

For this purpose, Rexroth has continuously optimized the standard and high-speed valves for this application for over 20 years. The end position cushioning of the stretching cylinders extends the service life and the specific front plate cover makes installation easier.

The newly developed electrical solution combines highly dynamic servo motors with fast mechanical drive units. With this mechatronic module, Rexroth makes full use of its in-depth understanding of the finely tuned interaction of different technologies from one source. Intelligent control units also increase versatility in production and can be integrated perfectly into all blow molding machines via open interfaces.

As highly configurable units – if desired, also with custom-developed components and subassemblies – they give machine manufacturers and users all possibilities for using cutting-edge technology for higher productivity.
Accomplish More with Less Energy

In filling, as with all other machines, processors strive for higher energy efficiency. Rexroth components and modules of all technologies offer decisive advantages in this regard.

Rexroth accompanies machine manufacturers and users through the entire process towards greater energy efficiency, from project planning to efficiency-optimized components to intelligent control concepts – while maintaining or even increasing productivity.

In pneumatic systems, online tools and air consumption calculators make optimum sizing of all components easier. Lightweight valves and compact valve/cylinder units are suitable for mounting directly on the actuator. This reduces the hose lengths and, as a result, the air consumption. Innovative electropneumatic pressure control valves divide the movement into various phases with different pressure requirements. This demand-oriented control saves energy during each movement. Overall, pneumatic solutions from Rexroth can reduce the energy consumption up to 55 percent.

In electric drives, regenerative supply units return the brake energy by switching the motor to generator operation. The electricity thus generated is used by other axes in the system, buffered or fed back into the power supply network. This reduces the external power consumption significantly.

For linear guides, the specific application of seals can increase drive power significantly. Low friction hub seals decrease friction by half. A wide range of weight-optimized linear components and the positive connection technique of the multi-axis systems without additional adapter plates reduce the masses to be moved.

Ultra-compact unit composed of control electronics and servo motor: IndraDrive Mi

Linear guide with low friction hub seal: half the friction means higher energy efficiency
To comply with the sanitary and hygiene requirements, even those of aseptic filling, the components must also follow special design principles. Rexroth has overhauled the entire design of numerous pneumatic and linear motion technology components according to the guidelines of hygienic design: bearings outside the direct contact zone, smooth surfaces and wide angles, no dead spaces, self-enclosed contours and fasteners with smooth surfaces. In Direct contact with acidic, alkaline or highly viscous recipes stresses the materials of all components in the wet area. Another factor in this area is the regular use of aggressive cleaning agents and steam jets. Only materials approved by agencies such as the United States FDA may be used here. Therefore, Rexroth makes consistent use of materials such as corrosion-resistant steel and high-performance plastics that provide lasting resistance to these stresses.
addition, Rexroth uses lubricants approved for the food industry. The corrosion-resistant version of the VarioFlow chain conveyor system is also ideally suited to the sensitive areas.

In addition to the basic sanitary and hygiene requirements, the function and performance of the automation must cover a wide variety of machines and processes: everything from bottle feeding to closing to controlled filling of carbonated beverages to portioning products of a highly viscous consistency. Conversion to different units of quantity and packages takes place at the touch of a button. Control solutions from Rexroth assume these complex tasks, and their modular design makes them ideal for closed-loop control of precisely these types of processes.
Transport and Labeling: 
Always at the Right Place

Labels, promotional stickers and additional design elements are important tools in the promotion of sales. A multitude of processing stations, which can be activated as needed, are required to allow for cost-efficient labeling of even small lot sizes. Using scalable automation components simplifies setup, operation and maintenance.

Different labeling stations pose the most varied requirements for automation. Nevertheless, filling plants can benefit from comprehensive standardization, as Rexroth automation modules offer a wide range of product families for which function and performance are precisely scalable.

A comprehensive spectrum of valve holder systems, cylinders and grippers covers the pneumatic movements.

Rexroth also offers highly dynamic torque and linear motors in addition to a wide spectrum of rotational motors. Innovative, motor-integrated drives require up to 70 percent less control cabinet space and reduce wiring effort by up to 85 percent. More import-
antly, they enable new degrees of freedom in making machines modular.

The demands on transport solutions are more complex today than ever before, as packaging assumes a growing number of functions. Moreover, current requirements for protection against tampering, anti-theft features as well as logistics and consumer information must be taken into account. For this purpose, more and more users provide high-quality packaging materials with barcodes, RFID or holograms, for example. As a result, all processes require gentle handling, even in places where the ability to accumulate pallets is required.

The maintenance-free VarioFlow chain conveyor system is optimally equipped for complex tasks as well. The cardan joint in the chain link enables horizontal and vertical conveying. Among the 40 basic types, almost all of which are FDA-approved, users will always find the correct chain. The modular system allows efficient extensions and conversions of conveyor paths – even as retrofits. The standardized components that can be supplied from the warehouse such as distributing guides, stoppers or other required components can be integrated into the conveyor path quickly and cost-effectively.

Precisely scalable performance and function: intelligent IndraDrive servo drives
Packaging and Palletizing:
The Fast Route from the Production Line Onto the Shelf

When the internationally accepted real-time Ethernet bus, SERCOS III, is used, cross communication between decentralized control units creates additional possibilities for modularizing plants. Different stations and machines are added into the line as required with just a click of the mouse.

The system solutions by Rexroth consistently rely on open communication interfaces and software standards. This guarantees our users a long-term protection of investment and gives them the assurance that they are using the best technology available on the market.

Prepackaging into bundles and the secondary package for transport links a number of different processes and machines. The common feature: high versatility through powerful control units.

Bag maker, top loader, shrink packer, robot: Rexroth offers the system solution that is perfectly optimized for the requirements of each packaging machine. A control platform that combines PLC, motion control and robotics in a single piece of hardware is the core component. Here, Rexroth relies on a PLC according to the IEC 61131-3 standard and, with multiprotocol ability, allows greater freedom for selecting the command communication.

Predefined components and functionality typical of packaging machines simplify the automation of even complex tasks. The „Flex-Profile“ developed by Rexroth, for example, automatically adjusts all dependent axis movements when a parameter is changed. The result: faster size changes and corrections without errors. With precise scaling, the drive, controller and PC-based variants cover all packaging tasks including palletizing and provide just as much control as is required by the respective task.

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Performance is of great importance for final packaging and palletizing. A high load capacity...
at continuously high cycle frequency is required here. With the camoLINE modules for handling systems, Rexroth offers a varied product line of electromechanical and pneumatic axes that fulfill these requirements. Ready-to-install linear modules with different drive variants and turn and gripper modules complete the fully equipped handling modules. Rexroth also significantly reduces the time customers spend configuring Cartesian motion coordinates. The positive connection technique eliminates up to 70 percent of the production parts that had been required previously. This has an important side effect: the mass to be moved is reduced by up to 40 percent, which further improves energy efficiency. The ability to use electric and pneumatic actuators in any combination also increases the versatility for cost-effective adaptations to modified tasks.

Fig. below: a servo-driven guide system ensures safety when loading the outer packaging for beverage cans
Rexroth: Everything from One Source

Perfectly matched components, energy-efficient, scalable and reliable: the comprehensive Rexroth modules provide important starting points for lowering the total cost of ownership for a production line.

The combination of all drive and control technologies from one source is an ideal solution and allows users to tap into the specific benefits of each individual technology. The components and modules specifically developed in accordance with the hygienic design guidelines are suitable for sensitive wet and dry areas; the precise scalability supports the efficient standardization within the entire filling line. In addition, intelligent assembly groups automate decentralized modules and stations, which are integrated into production lines by Rexroth system solutions in a versatile manner.

As a one-stop shopping partner, Rexroth thus reduces the complexity of even intricate systems and ensures maximum versatility, the best possible energy efficiency and highest reliability – the most important tools for lowering costs in the life cycle of a production line.
Bringing a System Partnership to Life – Experience Means Efficient Results

The industry specialists from Rexroth pool their worldwide application experience and are familiar with the special challenges which the food and packaging industries pose for automation technology.

As industry insiders, the specialists from Rexroth are aware of the special requirements relating to the automation of food and packaging machines. These specialists cooperate closely with Rexroth’s worldwide organization in more than 80 countries. Since Rexroth technologies enjoy an excellent reputation with end customers, the company’s specialists constantly pool information on the latest developments and challenges in the plants.

Working closely with machine manufacturers, the industry specialists from Rexroth continually develop innovative solutions. Even after commissioning, the worldwide sales and service network of Rexroth monitors the entire life cycle of machines all over the world.

Rexroth helps end customers to coordinate complex international projects. Projects are managed reliably through the combined resources of Rexroth. Permanent contact partners ensure that the project runs smoothly and is completed on time.

The automation solutions tailored perfectly to the particular tasks and the company’s worldwide organization are important requirements. But the highly skilled specialists for all drive and control technologies at Rexroth guarantee more: the experience for efficient results.
For additional information about the Rexroth solution range for the food and packaging industry, refer to the overview brochure and the detailed brochures „Dry foods and confectionery“ and „Cosmetics and pharmaceuticals“.