

Case story

Brewery more than doubles filling capacity with VLT® FlexConcept®

By installing a new KEG filling line using VLT® OneGearDrive® geared motors, frequency converters from the VLT® Automation-Drive series, and VLT® Decentral Drives, Rothaus AG has increased its filling capacity from 120 - 280 KEGs per hour with fewer drive types, and without increasing overall energy consumption.

Tannenzäpfle, Eiszäpfle and Weizenäpfle, to mention just a few of the well-known beers produced by Badische Staatsbrauerei Rothaus AG, have an excellent reputation among beer connoisseurs. The brand image, along with the girl from the Black Forest and the Norway Spruce cones, are also well known beyond the boundaries of Baden-Württemberg. The brewery was founded in the inn "Zum Rothen Haus" in 1791 by Prince Abbot Martin Gerbert II of the Benedictine monastery of St. Blasien, and is currently one of the most modern breweries in Germany.

Superior product quality was the brewery's highest priority even then, and this tradition has been upheld over the years. The firm therefore focuses on optimum hygiene and advanced production processes, which have required large investments in modern process technology over a number of years.

They include a new brewhouse, stainless steel fermentation and storage tanks, and extensive new piping. This allows the specialty beers from the Hochschwarzwald region to be produced using traditional methods such as cold fermentation and prolonged cold aging under optimal hygienic conditions.

Previous experience with Danfoss proved savings potential

Project manager Ralf Krieger and Filling Manager Roger Jäger, aided by their teams, selected Danfoss products for the drive systems of the new plant.

"We have used Danfoss frequency converters with success for several years and knew there was a potential to reduce the number of drive types in our production. The VLT® FlexConcept® also helps us to reduce our spare parts inventory," explains Ralf Krieger, who also took the opportunity to start testing Danfoss VLT® OneGearDrive®.

133%

increase

in filling capacity by
applying the
VLT® FlexConcept®

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In early 2011 a new, fully automated keg filling line that handles everything from cleaning to palletising was put into service. It is optimally integrated in the overall structure and reduces path lengths

"The KEG filling system also serves as a test system for the hygienic version of the VLT® OneGearDrive®.

Although these permanent magnet (PM) motors are not necessarily required in the plant, we decided to fit 25 of them in the wet area to test their long-term behaviour," he continues. The VLT® OneGearDrives® Hygienic are controlled by 25 VLT® AutomationDrive FC 302 units, which are housed centrally in an electrical cabinet.

Fully automated filling from cleaning to palletising

The new, fully automated KEG filling system was put into service in early 2011 and replaced an outdated system. As a result of repeated investments and plant remodelling, the route travelled by the beer on its way to the filling stage had become longer and longer in the old plant.

The new filling line was integrated seamlessly into the overall structure and reduces travel distances.

"The new filling line is fully automated; the only task that requires manual effort is supplying pallet stacks with 6 KEGs on each pallet to the infeed using a stacker. After this the stainless steel KEGs, which are fitted with RFID tags for quality control and tracking, pass through the entire system automatically. A robot turns the KEGs over with the valves facing downward and places them on a conveyor belt. The KEGs are cleaned on the outside and then automatically emptied and weighed," explains Ralf Krieger.

Only completely empty KEGs are transferred to the three parallel machines, supplied by the plant engineering firm Albert



The components used in the VLT® FlexConcept® have proven their worth in the plant up to now. All motors and frequency converters operate reliably, and their designs offer a number of benefits compared to conventional drives.

Ralf Krieger, project manager,
Rothaus AG



Frey, that handle the tasks of thorough internal cleaning, rinsing and sterilisation followed by filling with beer. The filled KEGs are turned over and fitted with plastic covers marked with all important data, such as the type, ingredients and expiry date, after which the finished KEGs are palletised by a robot. An automatic pallet truck then transports the freshly filled KEGs of Rothaus speciality beers on pallets to the Rothaus brewery finished goods stockroom.

System architecture

"We decided to build a centralised system architecture in the wet area of the plant, with the VLT® Automation Drive FC 302 frequency converters housed in a central electrical cabinet. The modular units were mounted directly side by side for compact installation," says Ralf Krieger.

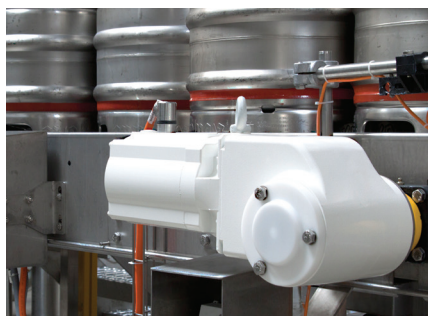
The standard induction motors in the dry area of the palletiser are controlled by 40 VLT® Decentral Drive FCD 300 units.

The compact dimensions of the frequency converters facilitate their installation in the plant. They are fitted with covers to protect them against falling KEGs.

The decentral drives are powder-coated and are therefore easy to clean. Angled cooling fins and smooth surfaces ensure easy and reliable drainage of cleaning liquids. Five LEDs indicate the drive status at all times, and a connectable display enables easy diagnosis.

Integrated components ensure efficiency

Another advantage of the Danfoss system is that the necessary EMC filter and mains chokes are factory fitted in all Danfoss VLT® frequency converters as integrated components. This saves even more space in the cabinet, which can be helpful in situations such as retrofitting existing plants, where space is usually limited.



The 25 VLT® OneGearDrive® Hygienic PM motors with high-quality coatings provide optimum protection of the drives against detergents and disinfectants and deliver optimum efficiency

As a result, the cabling effort is reduced while enabling the VLT® frequency converters comply with the applicable limits in the plant. The filters are also taken into account in the high efficiency figures, which are 98% or better. In practice, this translates into less heat dissipation and enables energy-efficient operation of the drives. The VLT® AutomationDrive FC 302 supports long motor cables as standard, which is extremely helpful in beverage plants with a centralised system structure. This eliminates the need for extra output filters as long as the cable length does not exceed 300 metres with unshielded cable or 150 metres with shielded cable, which reduces costs even further.

Energy costs unaffected by production boost

The new solution has enabled Rothaus boost filling capacities from 120-280 KEGs per hour with capacities of 10 to 50 litres. Impressively, the larger plant does not consume more energy than the previous plant.



Modernisation of the plant also boosted filling capacity from approximately 120 kegs per hour to as much as 280. The filling line is fully automated; the only task that requires manual effort is supplying pallet stacks with 6 kegs on each pallet to the infeed using a stacker

"The components used in the VLT® Flex-Concept® have proven their worth in the plant up to now. All motors and frequency converters operate reliably, and their designs offer a number of benefits compared to conventional drives. The equipment may optionally be operated in a centralised, decentralised or combined structure. All drives are designed for extremely high energy efficiency and provide good starting point for us to consider other projects with Danfoss products," concludes Ralf Krieger.

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Pallet transport motors in the dry area are controlled by 40 VLT® Decentral Drive FCD 300 units. They are fitted with covers for protection against falling kegs

About VLT® FlexConcept®

The VLT® FlexConcept® used at Rothaus AG is specifically aligned to the requirements of plants in the food and beverage industry. It utilises advanced technology in the form of PM motors, which have inherently high energy efficiency thanks to the permanent magnets in their rotors. The VLT® OneGearDrive® also has an especially wide speed range. Together with three gear ratios and optimal matching of the VLT® frequency converters to the motors, users can implement all drive tasks in the plant with a significantly smaller number of versions, resulting in significant savings in the spares inventory.

Hygienic design

All motors, as well as the frequency converters designed for use directly in the plant, have extremely smooth surfaces. This avoids recesses in which dirt could collect or deposits of product residues could form. The gear unit also mates seamlessly with the motor. This allows all detergents and any product residues to flow off easily, thereby preventing the formation of product residue deposits. Disinfectants with pH values in the range of 2..12 may be used.

EHEDG certified

Cleaning is easy because the IP66 or even IP69k enclosure design allows the motors to withstand typical cleaning processes, including high-pressure cleaning. For areas with especially stringent hygiene requirements, such as the aseptic filling of sensitive products, the units are available in an EHEDG certified version – presently unique in the drive market. An optional antibacterial paint provides even better protection for sensitive foods and beverages.

What VLT® is all about

Danfoss VLT Drives is the world leader among dedicated drives providers – and still gaining market share.

Environmentally responsible

VLT® products are manufactured with respect for the safety and well-being of people and the environment.

All activities are planned and performed taking into account the individual employee, the work environment and the external environment. Production takes place with a minimum of noise, smoke or other pollution and environmentally safe disposal of the products is pre-prepared.

UN Global Compact

Danfoss has signed the UN Global Compact on social and environmental responsibility and our companies act responsibly towards local societies.

EU Directives

All factories are certified according to ISO 14001 standard. All products fulfil the EU Directives for General Product Safety and the Machinery directive. Danfoss VLT Drives is, in all product series, implementing the EU Directive concerning Hazardous Substances in Electrical and Electrical Equipment (RoHS) and is designing all new product series according to the EU Directive on Waste Electrical and Electronic Equipment (WEEE).

Impact on energy savings

One year's energy savings from our annual production of VLT® drives will save the energy equivalent to the energy production from a major power plant. Better process control at the same time improves product quality and reduces waste and wear on equipment.

Dedicated to drives

Dedication has been a key word since 1968, when Danfoss introduced the world's first mass produced variable speed drive for AC motors – and named it VLT®.

Twenty five hundred employees develop, manufacture, sell and service drives and soft starters in more than one hundred countries, focused only on drives and soft starters.

Intelligent and innovative

Developers at Danfoss VLT Drives have fully adopted modular principles in development as well as design, production and configuration.

Tomorrow's features are developed in parallel using dedicated technology platforms. This allows the development of all elements to take place in parallel, at the same time reducing time to market and ensuring that customers always enjoy the benefits of the latest features.

Rely on the experts

We take responsibility for every element of our products. The fact that we develop and produce our own features, hardware, software, power modules, printed circuit boards, and accessories is your guarantee of reliable products.

Local backup – globally

VLT® motor controllers are operating in applications all over the world and Danfoss VLT Drives' experts located in more than 100 countries are ready to support our customers with application advice and service wherever they may be.

Danfoss VLT Drives experts don't stop until the customer's drive challenges are solved.

