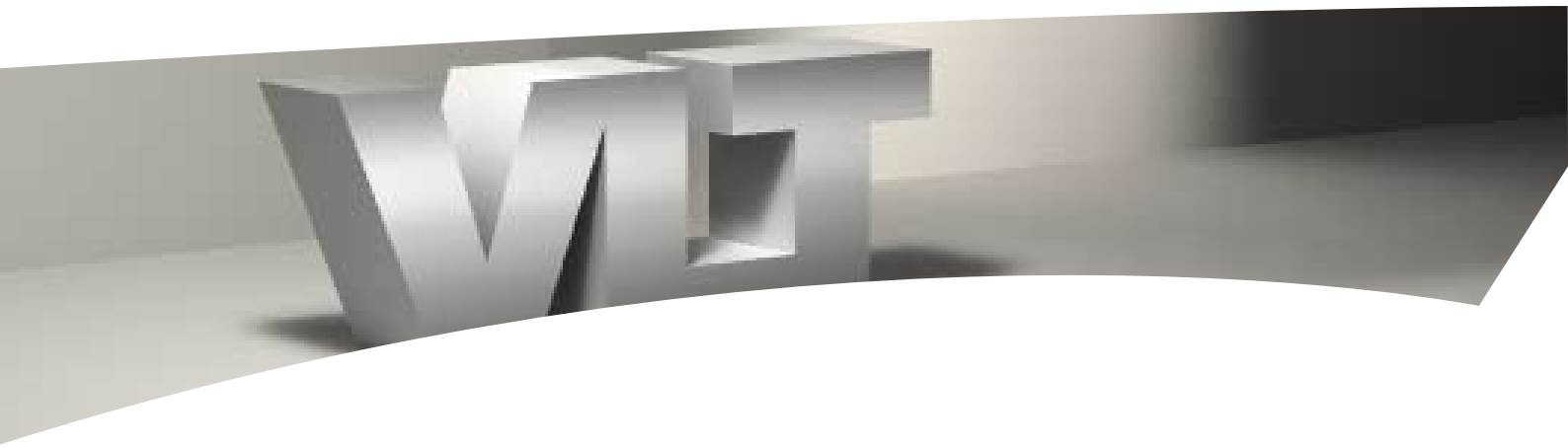


VLT® drives and Pilz control motive power systems in baking and fermentation lines

Everyone knows and enjoys pretzels. One of the best-known manufacturers of this traditional baked snack is Huober Brezel GmbH & Co. It relies on cutting-edge motive power engineering. For example, Danfoss frequency convertors are used together with Pilz safety engineering to control motive power systems in baking and fermentation lines.

The recipe of the standard Huober pretzel goes back to an invention in 1939. It was then that Emil Huober, the later founder of the company from a craft bakery, developed the big pretzel as a baked product, which enjoyed increasing popularity under the slogan "Huober Preztel – always fresh and crispy".

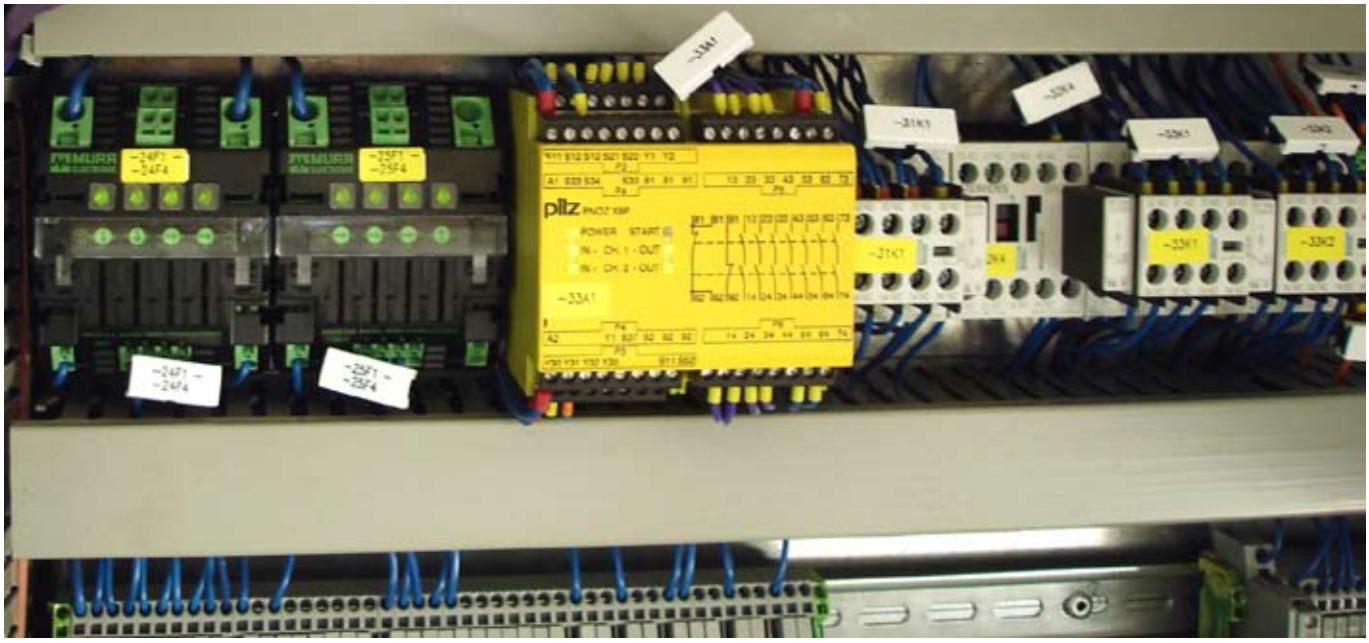
The war and subsequent captivity delayed the foundation of the current company Huober Brezel GmbH & Co. until 1950, however. In 1980, the company was taken over by Karl Huober, the founder's son, and now has a workforce of 150 and specialises in the production of soda-baked products and salty baked snacks. Its products include four different sizes of pretzels, salty sticks, long sticks, beer sticks and other specialities, all with organic ingredients.

The company owes its success to high-quality products, an innovative range of products that meet current demands and, in particular, Huober's roots. The aim of the company is therefore not maximum automation but to focus on producing very tasty baked goods of the best possible quality, maintaining a relationship based on trust with its staff and, not least, using the knowledge it has acquired regarding dough and production technology.

At this company, dough is still mixed by bakers from flour, malt, palm oil, salt and yeast, all of which are organically produced without chemical additives, the dough's consistency and processing in the huge kneading machines are individually controlled and the baking lines are filled by hand. Nevertheless, the production of about four million crispy pretzels a day requires a certain amount of automation. Although the pretzels were once plaited in soft women's hands, they are now punched out, but they are not pressed, as in most pretzel works. In the fermentation channel, the pretzels rise and increase in volume before baking. They then pass through a cold soda lye bath and are strewn with large-grained salt and baked until crispy.

Modernisation of the fermentation chamber relies on the latest motive power technology

To meet increasingly demanding market requirements while at the same time keeping quality high, adaptation and modernisation of the fermentation and baking oven lines are necessary. Arne Lichtenknecker of the HUOBER engineering team is responsible for planning the electrical aspects of the installation and



the resulting work that is necessary. He is supported by Martin Trautwein from elektrotechnik + automation Ulrich Brodbeck GmbH, which specialises in automation and is a Danfoss systems partner. This also applies to the planned modernisation and reconstruction of the fermentation chamber in one of the production lines.

The fermentation chamber is an essential part of the production process. The pretzels enter this chamber just after they have been stamped out and separated from the dough. On the 75 m long line, they have a few minutes in which to ferment and form a skin to effectively prevent penetration by the soda lye in the next step of the process before baking. This keeps the lye on the surface, giving this baked product its typical appearance.

Best possible protection for staff

Mr Lichtenknecker wanted the new fermentation line to offer a high level of operating reliability throughout the entire system. Because of the great importance of fermentation for the quality of the final product, the fermentation process itself must not be interrupted. It was therefore necessary to ensure easy and rapid handling when starting and servicing the line. In the event of a malfunction, the "Safe stop" must ensure the best possible protection for staff when the emergency cut-off switch is actuated or the doors of the fermentation tunnel are opened. The general conditions also make considerable demands on the electronics of the frequency converters used, however: temperatures of about 45° Celsius are reached in the vicinity of the fermentation tunnel.

VLT® control of conveyor belts

When selecting its motive power technology, Huober chose VLT® AutomationDrive frequency converters from Danfoss. Like all VLT® converters, the FC 302 also has built-in RFI filters and intermediate circuit coils. A USB and a RS485 interface are available for external communication. These interfaces can be used with MCT 10 configuration and parametrisation software to connect a PC or laptop to the RS485 directly or via an interface converter, making it quicker and easier to start the equipment. Alternatively, various field bus interfaces can be used via modules.

10 years of positive VLT® experience

Danfoss systems were chosen mainly because of Mr Lichtenknecker's previous good experience of working with Danfoss VLT frequency converters: Danfoss products have been used in the various fermentation and baking lines for over 10 years, with only one failure in all that time.

Huober values the frequency converters in particular because they are quick-starting, can be used universally and have sufficient I/O interfaces. The units are also deliverable with brake chopper and braking resistors can be connected to them. The reliability, usability in high ambient temperatures and small dimensions of the VLT® AutomationDrive are also important in the proposed solution.

Danfoss frequency converters are not only used in this fermentation tunnel: Huober also appreciates their reliability in the ovens area, other fermentation channels and the packaging machinery. This versatility reduces the time it takes to train the staff. It also makes keeping spare parts easier. For optimal adaptation to the various motors, VLT® AutomationDrive has an automatic motor adaptation (AMA), which determines the exact values of the motor connected.

Good support and rapid response
The good support and rapid response if there is a fault provided by Danfoss partner company Ulrich Brodbeck GmbH and Mr Trautwein also help to keep Mr Lichtenknecker happy. Any questions and requirements that arise can be quickly and easily handled thanks to the good co-operation between the two companies.

VLT® AutomationDrive FC 302 converters with safe stop facility and Profibus interface are used in the fermentation tunnel. An SPC facility, which is also linked to the main machine, passes on the control signals to the connected frequency converters, which then control the connected motors depending on the fermentation time and requirements.

Safe stop for belts – Danfoss and Pilz components match one another perfectly
To protect the staff as soon as the doors of the fermentation tunnel are opened or the emergency shut-off switch is actuated, Mr Lichtenknecker relies on a combination of Pilz PNOZ safety components and the VLT® AutomationDrive with safe stop facility to stop the conveyor belts in the fermentation tunnel. Motive power is de-staged via a safe pulse blocking function of the VLT® AutomationDrive's inverter. In this process, a digital input provided solely for this function (terminal 37) turns off the supply voltage of the control signals for the final stage of the inverter. At the same time, control is set internally to coasting and must be acknowledged before a restart. Care must be taken to ensure that the final shutdown of motive power after the line has stopped does not also result in disconnection of the power supply.

This safe pulse blocking facility prevents the motor from turning even though high voltages may still be reaching the motor terminals.

Danfoss and Pilz work together
The signal input must be controlled by safety modules that meet these requirements. Pilz PNOZ components are an excellent way of achieving this. Danfoss and Pilz therefore work together to ensure that their products match one another as closely as possible. Huober appreciates the analysis of the emergency shutdown switches and door contacts fitted on and in the fermentation tunnel in such a relay.

The total solution used with a PNOZ safety module for analysis and safe stopping of the AutomationDrive is able to combine individual drives into stopping groups depending on their function in the system much more easily than traditional voltage separation with mains contactors, enabling the safe status to be limited to the desired areas. Another advantage is that it is not necessary to consider the charging/discharging time of the frequency converter intermediate circuit if the protection function is initiated fairly frequently. A higher level of system availability is therefore possible.

Reliable and safe
Huober relies on its craft tradition combined with modern plant engineering. It has therefore decided to use state-of-the-art VLT® AutomationDrive frequency converters in conjunction with Pilz safety technology. This solution is characterised by reliability and safety of operation, while being easy to start and operate.

Further plants will be constructed during conversion and modernisation. When they are built, Danfoss will once again help to convey these tasty pretzels safely.

Huober Brezel GmbH & Co was founded in 1950 as First Württemberg´s pretzel works Erdmannshausen (which is a small town) near Marbach am Neckar, and can now look back on a history of over 50 years.

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