Drive Technology for a Bottling Plant

NORD Drive Systems

The Hacklberger Getränke- und Logistikcenter (Hacklberger Beverages and Logistics Center), founded in 1998, is a spin-off of the Hacklberger brewery, where according to historical documents, beer has been brewed since 1618. The company supplies about 1,200 beverage dealers and is one of the largest breweries in the German area of Bavaria.

The beverages bottled here include 14 different types of beer, 25 types of alcohol-free beer, four types of mineral water and 12 kinds of merchandise. Over 300,000 hectolitres leave the production facilities each year; and the new bottling plant fills up to 36,000 bottles per hour.

Consumers usually tend to put a mixture of various bottles type into the crate in order to return it to the store. This is difficult to manage when the crates of mixed bottles arrive at Hacklberger.

On arrival, the crates are loaded onto a conveyor system that brings them into the actual production hall. Then the crates are put onto a specific dedicated belt where they are automatically identified and moved to the appropriate storage areas. Bottles and crates that are not recognized are arranged into the correct sequence for manual sorting. The crates then pass through a crate-washing system.

In the next stage, the screw caps are removed from the bottles as necessary. Crown caps and other closures are also removed here. The bottles are then conveyed to the washing system. After a sophisticated washing process, the bottles are checked for damage and dirt, or defective bottles are automatically rejected.

After the bottles are refilled with beverage, they are automatically fitted with screw caps or crown closures, and labeled. In the next stage, they are conveyed to the

output station, where the bottles are packed into crates and then stacked on pallets. Once the pallets have been banded, they are finally transferred back to the central storage area.

Packaging, palleting and transport technology are provided by a single source, the BMS Maschinenfabrik company.

"One of the important things was the interaction of automated technology, as well as the possibility of being able to use the various containers which are unpacked by the system using a wide range of sorting methods. Customers always come to us when they require a special solution, which seems impossible. That is, so to speak, our niche," explains Gerhard Bielmeier, designer at BMS Maschinenfabrik.

"It is the speed of the system that is decisive, and the speed is provided by the drive units. Therefore, the drive technology is the decisive factor for the productivity of our systems. Our success is certainly partly due to the innovative drive technology from Getriebebau NORD, which we have used consistently for many years,” says Bielmeier.

NORD mechanical and electronic drive technology is used in the BMS packaging, palleting and conveyor systems. Distributed system concepts are being implemented with the compact trio SK 300E, a combination of a geared motor and a fully equipped frequency inverter.

The SK 300E frequency inverter is mounted directly on the motor and is therefore integrated into the drive unit. The inverter has a maximum protection class of IP55 or IP66. The CANopen interface on the frequency inverter enables the parameterization and control of the devices. Up to 127 participants can be addressed on a single bus. In addition to distributed drive units, centrally installed SK 700E series frequency inverters are also used. They include POSICON positioning control, which enables the implementation of relative or absolute position control.

"The additional positioning possibilities simplify the task of the control system. For example, there is the possibility of using a photoelectric beam detector to directly control the drive unit, so that it stops or starts again. That is easy to program," says Bielmeier.

Energy efficiency and environmentally friendly drive technology were also important factors in favor of NORD as a partner. The company is one of the pioneers of energy-saving drive technology and, since the ‘90s, has continuously expanded its know-how in this field. The NORD drive units are equipped with an energy-saving motor and a two-stage bevel helical gear unit with 97 percent efficiency.

Furthermore, all equipment is painted with an environmentally friendly paint, and biodegradable oil is used for lubrication. With their sensorless current vector control, the frequency inverters also ensure optimum adaptation of the drive units to the application parameters and process conditions. The trio SK 300E units have low electromagnetic emissions: supply cables between the inverter and the motor are not needed and therefore cannot be a source of EMC interference. Integrated mains filters keep the supply network free of interference.

The NORD trio SK 300E combines the frequency inverter, the motor and the gear unit into a compact unit which includes a line filter. The inverter unit is plugged on to the modified motor terminal box (adapter unit). Drives with ISD current vector control provide high starting torque and considerable overload reserves. This robustness makes them usable in almost any application.

The SK 300E is resistant to typical sources of interference, such as fluctuations in mains voltage or rapid temperature changes. The devices are especially easy to control and program. The distributed drive units can be coupled to overriding control systems by means of many common field bus systems, ranging from Profibus-DP to Canopen/DeviceNet and InterBus or an ASI interface.

For local manual operation, the frequency inverter with rotary knobs on the front panel is available. Directly on the machine, they allow changes to the speed and direction of rotation with a single step. The new SK 225E and SK 235E models with an onboard AS interface from the SK 200E Series are available with outputs from 0.25 to 7.5 kW. SK 200E inverters are directly mounted on the motor terminal box in order to create combined fully integrated drive units for use in the field. For AS-i wiring, only the yellow bus cable needs to be connected. These robust, reliable and economic systems are suitable for large plant installations, e.g. conveyors, and are specially optimized for price-sensitive market segments.

Designed for the medium to high power range, the SK 700E is optionally available with the POSICON position control function, which enables movement to up to 252 positions. Optional modules are available to suit many common field buses, so that

the SK 700E inverter can be smoothly integrated into existing automation architectures.

In addition, the device has a TTL rotary encoder input and an SSI interface for the direct connection of absolute encoders. As standard, the devices are equipped with a brake chopper and line filter (for limit curve A as per EN 55011, up to 22 kW). The combination of a high-performance inverter and extensive protection and monitoring systems for the inverter and the motor ensures the great reliability of the system.

For more information, please visit www.nord.com *[1].*

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