Drive technology TODAY

Proof of efficiency instead of naive assumptions

Mechatronic drive system in food production

▶ Outstanding product quality, reliable handling of manufacturing processes and strict hygiene regulations are all key when manufacturing water- and milk-based drinks. Ennstal Milch KG, based in Styria, Austria, uses cartocan® for this – an innovative and environmentally friendly packaging. The company uses MOVIGEAR® from SEW-EURODRIVE to transport these cans. The mechatronic drive system meets all the requirements of the food industry in terms of hygiene equipment, high energy efficiency, easy controllability and good use of space.

▶ Ennstal Milch KG in Stainach, Styria, is an innovative manufacturer of milk products and a partner for major branded article and trade companies. Good raw materials, innovative staff and cutting-edge technology provide the basis for its internationally competitive range. The company is absolutely committed to sustainable conservation of energy and resources. It therefore joined forces with a consultancy company to implement several measures to improve the use of heating and cooling energy and compressed air. These have enabled the company to save more than one and a half million kilowatt hours of energy a year.

In one state-of-the-art dairy and two cutting-edge cheese factories at the two Ennstal sites in Stainach and Gröbming, the company's 150 employees transform natural raw materials into high quality products. Along with the high quality of its foods, the company's success is also helped considerably by functional and attractive packaging. Cartocan® has proved itself to be a cutting-edge and functional packaging material for milk- and water-based products. This environmentally friendly, slimline can is made from a sturdy, water-repellent cardboard composite and is available in the sizes 150 ml and 250 ml. ▶

High efficiency thanks to precise project planning

Many systems used to be planned with large safety margins. This frequently led to drives being oversized. Worst case scenarios were often used to plan for coping with e.g. the overload at start-up. This meant the system was only able to run at 30 % of its nominal load in normal operation. An asynchronous motor that is working at such low capacity is oversized and has a low level of efficiency. In principle, the drives must be designed around the normal operating scenario, and special cases assessed separately. During project planning, SEW-EURODRIVE places great emphasis on ensuring the drive operates as close as possible to its nominal load in normal operation- which is frequently continuous operation.

In principle, synchronous motors can be operated with high overloads. The SEW-EURODRIVE mechatronic drive units, for example, have an overload capacity of up to 400 %. This means exceptional scenarios such as blockages and overloads caused by sticking (if a drinks can bursts) can be handled easily. The more precise design usual today is one of the key reasons why MOVIGEAR® can achieve such high energy savings. Added to this is the expert energy advice provided by SEW-EURODRIVE.

SEW EURODRIVE

Ennstal Milch KG in Stainach, Styria, Austria, feels it has a great responsibility to nature and the environment. The company is absolutely committed to the sustainable conservation of energy and resources. (Photo: Ennstal-Milch)

Flexible vertical conveyors

Ennstal Milch has been operating a fully aseptic (germ free) cartocan® plant for two years. Products are filled under strict clean room conditions. The MOVIGEAR® mechatronic drive system from SEWEURODRIVE is used for hygienic and energy-efficient transportation of the drinks packages.

The filled cans are first lifted one story - about 4m - by a vertical conveyor equipped with a clamping mechanism. This consists of two parallel circulating chains with rubber flaps that gently grip the cans and convey them upward.

Efficient controlling

For the clamping conveyor to work effectively, the two chains must run in synchrony. The conventional drive solution for this consists of a gear unit, a motor with shafts on both sides and a frequency inverter. The motor drives two wheels via a cardan joint attached to each one. This ensures the wheels are mechanically synchronized. This solution involves a great deal of assembly and maintenance and is cost-intensive. A different, cutting-edge solution is therefore now being used in the form of the MOVIGEAR® mechatronic drive unit.

The integrated synchronous motor makes it easy to synchronize the speed of several drives. Speed setting and control is managed through the Single Line Network (SNI) drive infrastructure. The MOVIGEAR® SNI d rive unit on this facility easily t ransports 12 000 round packages an hour, or even more. This is a simple and effective solution for transporting cylindrical articles such as cartocan®. When set up correctly, it applies symmetrical clamping pressure on the drinks cans. This means that the same load is applied to both

Phase-synchronous operation for square packaging

While speed synchronization is perfectly sufficient for round packaging, transporting square packaging requires a higher degree of accuracy with phase-synchronous operation. The “extended speed control range” option is used for this. This enables speed adjustments down to zero revolutions, positioning and phase-synchronous operation. An encoder system integrated into the MOVIGEAR® is used for this purpose. The mechanical dimensions of the drive therefore remain unchanged and no additional evaluation electronics are required. Phase-synchronous operation is calculated centrally using the Configurable Control Unit (CCU). This is part of the SEW-EURODRIVE controller range and consists of standardized, ready-to-run application modules. The two mechatronic drive units are synchronized through the CAN-based SBus system bus.

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High-quality products in sustainable packaging

More than 60 percent of the material that goes into making cartocan® packaging comes from renewable raw materials. Responsible, ecological forestry means that the wood pulp fibers are constantly being replaced. As a result, this drinks packaging displays the Forest Stewardship Council (FSC) label, an internationally recognized award for processing wood fibers. The weight of these carton cans is significantly lower than alternative plastic packaging materials. Careful processing of the products at Ennstal Milch means taste, consistency, color and aroma are all retained. Since the drinks are filled in a fully aseptic environment, they have a guaranteed non-cooled shelf-life of up to 12 months. A special barrier layer in the packaging material provides oxygen protection and a very high light protection factor. This ensures valuable vitamins are preserved and gives a taste that lasts.

drives, running in synchrony at identical speeds. The distance between the two MOVIGEAR® units is determined b y the d iameter of the cans. Since the can diameter at Ennstal Milch is constant, the drives were fitted to the facility at a fixed distance. However, this distance can be adjusted using a spindle if several formats are to be transported. The Movigear mechatronic drive system is also used to transport the packages onward. It provides constant torque over the entire speed range, and is designed to cope with continuous operation.

High standard of hygiene

The whole facility is connected through the SNI drive infrastructure solution, with a single cable connecting the whole line. The drive is provided by 16 MOVIGEAR® SNI m echatronic d rive u nits. T hese a re c ontrolled by two MOVIFIT® FDC decentralized drive controllers. These connect the drive network via Profinet to the higher-level controller, which specifies the speed setpoint and ensures a shutdown in the event of a blockage. The exact same device variant is used throughout the facility, for both the horizontal conveyor technology and the two clamping conveyors. This considerably simplifies spare parts stocking for the customer.

For use in the dairy, all of the Movigear ® drives are equipped to be used as a wet area package and given an HP200 coating. This involves applying a powder coating to the individual parts before assembly. This occurs at very high temperatures. As a result, the powder is baked into the surface. This coating can be applied in a much thinner layer than paint - just a few micrometers thick. The molecular connection makes the result more mechanically resistant. The resulting non-stick property comes very close to PTFE. The customer therefore gets a product with very high chemical and mechanical resistance that can withstand any cleaning. There is no risk of peeling paint on this hygienic drive – a fact that was key to Ennstal Milch's decision to invest in MOVIGEAR®.

Good raw materials, innovative staff and cutting-edge technology provide the basis for its internationally competitive range. (Photo: Ennstal-Milch)

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Compact packaging facility

The milk producer operates a compact line in a relatively small space that transports the cartocan® drinks cartons to the packaging machine without buffers. All work processes happen “on the fly”. The only buffer used is a small table that holds around 1000 cans. Each of the mechatronic drive units also has a local buffer space with a sensor. These sensors are connected to the Movigear ®, which has four sensor inputs as standard. The signals from these are transferred to the controller via the SNI.

Ennstal Milch uses a combined wrap-around carton and shrink wrap system from Meypack for final packaging of the cartocans®. This looks after the format and wrap-around. Depending on what is required, this could be a tray (with or without film) or a six-pack. The VP 501 SW 60 TM system can also process pure multipacks. In this case, the products go through the carton packaging section loose and are then wrapped in film in the downstream shrink wrap section. ◀

In the vertical conveyor, two parallel chains with rubber flaps gently clamp the cans and convey them upward. (Photo: Ennstal-Milch)

The Movigear mechatronic drive system from SEW-EURODRIVE is used for hygienic and energy-efficient transportation of the drinks packages. (Photo: Ennstal-Milch)

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