

## AT RITTER SPORT

### The chocolately side of MX



#### Ritter Sport has placed its trust in a KNOLL progressing cavity pump

*Constant pressure and throughput combined with compact size, hygienic design and heatability – that is what the management at Ritter Sport value most about the KNOLL MX progressing cavity pump. The chocolate manufacturer utilizes these pumps in various areas: for pressure-independent pumping of high-fat filling to the aeration unit and pumping of chocolate with a constant mass to the tempering unit.*

Waldenbuch, a small town in the Swabian district of Böblingen, has a historic parish church, a castle, about 8500 inhabitants – and a famous name: it is the home of Ritter Sport, a brand which today 99 percent of all Germans are familiar with. The 100-year-old company produces its chocolate squares exclusively in its hometown, because "this is the only way in which we can guarantee the high quality of our squares", admits Alfred T. Ritter, Chairman of the Ritter Sport Management Board and grandson of the company's founder.

The management takes great pains to ensure that quality is maintained and is always looking for ways to improve its product. This means: the bars stay square, the packaging stays coloured and the contents are always of the highest quality. To ensure that new products also meet the high-quality standards, Johannes Schraid, Head of Systems,

places a strong emphasis on process optimisation. The trained food scientist, who has been working in the Engineering department at Ritter Sport for some 20 years now, is the "go-to guy" it comes to the production of new products and varieties – and to designing, planning and ultimately implementing new production systems.

#### Progressing cavity pump provides controlled processes

This was also the case in 2008 when the company set itself the task of making a "light whipped" gas-aerated filling for a new product. This is achieved using an aeration unit which aerates a defined amount of the filling with a given amount of gas strictly according to recipe. The displacement pumps used previously by Ritter Sport for feeding the filling proved less than ideal, because throughput was not 100% controllable. Johannes Schraid explains: "Our conventional pumps react very sensitively in terms of their delivery rate to variation in backpressure, which cannot be entirely avoided in our pipe system. This is why we needed a pressure-independent pump system."

Working in collaboration with the machine supplier, the systems planners at Ritter Sport decided to adopt a progressing cavity pump, which reliably maintains a constant volumetric flow rate independent of pressure thanks to its gap-free principle. The choice of pump supplier fell on KNOLL Maschinenbau, Bad Saulgau. A few months previ-



Before the chocolate mass passes through the tempering unit, it is liquefied in what is known as a "conche" (Spanish for "shell") and mixed with other ingredients.



After the tempering process, in which the chocolate mass is pre-crystallised in a controlled way, the viscous mass is dispensed into plastic moulds.



Ritter Sport produces up to 50,000 100g bars of chocolate an hour on its big production lines. Accordingly, the processes have to be absolutely reliable. Photos: Ritter Sport

ously, documentation on the KNOLL MX30S progressing cavity pump had been sent to Ritter and was found to be particularly interesting in regard to several design features. In the course of discussions with the in-house designers and the machinery manufacturer, the MX emerged as a strong favourite. They were especially impressed with the ability of the MX to maintain a constant high pressure and throughput despite its relatively compact size. Other decisive factors were its hygienic design and the corresponding choice of materials (stainless steel), as well as the heatability of the pump.

### EvenWall® technology makes the difference

KNOLL Maschinenbau had developed its MX progressing cavity pump based on the latest findings only a few years earlier and put it on the market in 2004. A special feature of this pump is the use of EvenWall® technology, which clearly sets it apart from conventional designs.

With EvenWall® technology, the stator lining is adapted to the contours of the rotor the elastomer and coated in a layer of elastomer with an even wall thickness. Depending on the size of the pump assembly, this wall thickness can vary between 4 and 12 mm. This has a number of advantages compared to conventional designs, where the stator lining has a cylindrical outer geometry and accordingly the wall thickness of the elastomer varies. By using EvenWall® technology, the MX progressing cavity pump offers much higher stability under pressure, reduced backflow, longer life, higher efficiency, less shear effect, enhanced intake

and the ability to withstand large variations in temperature (such as during CIP cleaning operations) without the need for modification of the rotor. Whereas conventional progressing cavity pumps are limited to pressures of between 4 and 6 bar, the MX pump delivers a pressure of at least 10 bar with its chamber closed. Thanks to its multistage design, the MX progressing cavity pump can provide pressures of up to 80 bar.

### The basis for a stable tempering process

The independence of delivery rate from pressure was a key factor allowing the MX to be used upstream of the aeration unit. But the systems team under Johannes Schraid was also so impressed with the other characteristics of the KNOLL MX pump that they decided to utilise the pump within the tempering system as well. This is a pro-



Johannes Schraid: "For pumping the chocolate mass through the tempering system, we have replaced the previous displacement pump with a KNOLL MX30S progressing cavity pump. This is the basis for a highly stable crystallisation process."

cess stage which comes after liquefaction and storage of the finished chocolate mass in a buffer tank and filling into the final mould.

This tempering process is a key step in the overall production process. For this purpose, the hot, liquid chocolate is pumped through a special tempering unit which contains water-cooled elements and acts as a heat exchanger. When the chocolate mass cools down, the cocoa butter contained in the chocolate forms fat crystals which increase the viscosity of the chocolate mass. The company requires that the crystals be modified in a certain way, because this is a factor determining the subsequent consistency and shelf life of the chocolate cooled in the moulds.

To reliably control this precrystallisation process, it is important that constant conditions be maintained within the tempering unit. Johannes Schraid explains: "We pass the chocolate mass through the unit at a temperature which, depending on system, varies between just a tenth and half a degree. This is only possible if a constant mass flow is maintained. Since it is important to avoid any variation in throughflow rate, we decided to switch from the displacement pumps which we originally used to the KNOLL MX30S progressing cavity pump. This helped us to achieve a highly stable crystallisation process."

The pump is mounted on the tank containing liquid chocolate mass and pumps this mass through the tempering unit

to the dispenser unit, which, in turn, fills the moulds. This dispenser unit is already an integral part of a continuous line at Ritter Sport, which can be up to 50 or 80 m in length and in part extends across three storeys. A line of this kind – there are several such lines at Ritter Sport – has the capacity to process up to five tons of chocolate per hour. This is equivalent to 50,000 100g bars passing through the system and being gently cooled every hour. The entire tempering process at Ritter Sport is monitored using complex analytical methods so that the chocolate manufacturer can be sure that every bar of chocolate tastes delicious and that the segments break off in their typically crisp and smooth way.

## KNOLL pumps can also be custom-designed

The KNOLL X30S progressing cavity pump must, of course, be capable of handling a throughput of 5,000 kg/h, which does not present a particularly tough challenge. It also has to be heatable in order to ensure that optimal conditions of delivery are maintained. Otherwise, in the event of a stoppage, the chocolate mass would set and prevent the system restarting. The MX pump has a double-walled jacket which can be heated using water. To ensure that no water can get into the product under any circumstances, the ja-

## Key features of the MX

- Intelligent separation points for easy disassembly
- Maximum chamber utilisation
- Robust, enclosed, wear-resistant universal joint
- No foreign medium in the joint (lubrication)  
Vertical and horizontal configurations are possible
- Can be used in any direction of rotation
- Self-priming pump to 0.2 bar absolute
- Available as a mobile or stationary pump
- CIP and SIP cleaning connections are standard
- The pump system is sealed and therefore suitable for safety-critical media
- Prepared for temperature control of the complete pump
- Short overall length



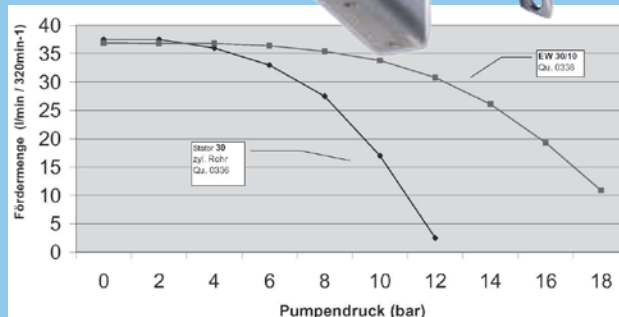
A special feature of this progressing cavity pump is its use of EvenWall® technology. The stator lining is adapted to the contours of the rotor and coated with a uniform layer of elastomer 4 to 12 mm thick.



Not square – but still practical and good: the KNOLL MX progressing cavity pump provides stable pressure and throughput despite its compact size. Ritter Sport also values its hygienic design and heatability.

Photos: KNOLL Maschinenbau

EvenWall® technology offers much higher stability under pressure and provides a regular linear characteristic.



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cket is not only sealed with O-rings but also welded all-round. "Water is one of the worst enemies of chocolate production", Johannes Schraid explains. "Ingress of water into the product would be disastrous in terms of hygiene and production, and this has to be avoided at all costs. Therefore, we asked KNOLL to make a custom design with a welded heating jacket, and they did this to our fullest satisfaction."

He also points out another criterion that makes the MX progressing cavity pump very conducive to use in chocolate production: it is compactly designed and has a relatively small volume in which chocolate residue can collect when the pump stops. Furthermore, it has a virtually pocket free design which is an advantage when changing over to a different product. The food scientist explains: "Of course, we do not clean the pump with water, rather we flush it with chocolate from the next batch. There is also a cost benefit in being able to quickly remove residual product."

## Certified to EHEDG, QHD, GPM and 3-A

Whatever the application, it is important that the MX progressing cavity pump consistently meet all hygiene requirements of the foodstuffs industry. These include that the design be virtually pocket free and that all metal parts in contact with the product be made of stainless steel. This material and high-quality elastomers – all certified for hygiene applications – increase the system's resistance to corrosion, temperature and chemicals. Furthermore, the MX is very easy to clean. CIP and SIP cleaning are standard. This means that the pump can be cleaned on site without leaving residues and without dismantling. With all these properties, the KNOLL MX progressing cavity pump satisfies the guidelines set out in EHEDG, QHD, GPM and 3-A.



The KNOLL MX30S progressing cavity pump is located between the buffer tank and the tempering unit. It provides a constant delivery rate and thus allows controlled crystallisation of the cocoa butter.



The KNOLL MX30S progressing cavity pump has been fitted with a double-walled, welded jacket at the request of Ritter Sport.

## The world of chocolate squares

Alfred Ritter GmbH & Co. KG is a family-owned company which in 2012 will be celebrating two anniversaries: the 100th anniversary of the founding of the company and the 80th anniversary of the invention of its trademark square chocolate shape. Last year (2011) was the most successful year in the history of company, which posted sales of EUR 330 mill. The approximately 900 employees at the parent factory in Waldenbuch currently produce some 2.5 million bars of chocolate a day. Every fourth 100-gramme chocolate bar sold in Germany is a Ritter Sport.

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Everyone knows the square bars of Ritter Sport. To ensure their high quality, the production processes are constantly being improved.

Photo: Ritter Sport

