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10,000 N interlocking force on Microcut Safety for the Stephan Vacutherm system

User-friendliness, high levels of safety, wide range of applications and availability, these were the most important requirements from Stephan Machinery, which produces food manufacturing machines. Therefore, for its Stephan Vacutherm System VMC 1200, which was primarily developed for the production of delicatessen products, the company decided to use the new AZM 400 solenoid interlock from Schmersal.

There is an increasing level of demand for quality convenience food products in today's market. The increasing importance of the "work/life balance" also translates into more demand for high-quality foods which are simple to prepare.

In recent years, Stephan Machinery has developed into a leading manufacturer of machines for the production of a wide range of food products. The company, which was founded in 1953 by the Stephan family in Hamlin near Hanover, has its own engineering department, which allows it to provide its food-industry customers with turnkey solutions.

Following the trend to more convenience products, Stephan developed the Vacutherm, which it has continuously optimised in cooperation with the producers of delicatessen food. This system is used to produce soups, pasta sauces, traditional sauces, mayonnaise/ketchup, dressings, dips and baby food in various batch sizes, from 400 to 1200 l.

External homogeniser

The basic components of the process systems are a diagonally arranged, vacuum-sealed mixing container with a mixing tool and an external homogeniser, the Microcut MV. The special design of the container and the mixing arm guarantee effective, gentle mixing of a wide range of raw materials. The Microcut MV works on the rotor-stator principle to chop and emulsify the raw materials.

"The benefit of Microcut is that it has different tools which can achieve speeds of 300 and up to 3000 revolutions per minute, depending on the particle size demanded by the customer's recipe. This makes Microcut very flexible," explains Stefan Zirpel, Automation Engineer at Stephan Machinery.

The reproducibility and the consistent quality from batch to batch are the most important criteria in the food industry. For example, pureed food must always have the same consistency. Particle sizes which differ from the product specification must not be contained in the end product. In the Microcut, the product is efficiently processed using the established contactless rotor-stator principle. The holder ring, known as the stator (cutter ring) has consistent cutting plates made of hard metal fitted to it. Depending on the cutter ring selected, the gap width is between 0.1 and 3.0 mm. The rotor spinning inside the chamber (cutter head), which is also fitted with cutters, runs at a distance from the stator blades. The cut is made along the whole length of the cutting gap. The product is specifically fed through this cutting system to ensure it leaves the machine consistently chopped and perfectly emulsified.

Safe AZM 400 bolt interlock

The cutting tool in the Microcut is in a robust stainless steel casing that is opened to replace the tools and for cleaning and maintenance. The Microcut is now secured with the new AZM 400 solenoid interlock



Fig. 1: Stefan Zirpel (links), Stephan Machinery and Markus Graßmann, Schmersal, in front of the mixing container of the VMC 120 Vacutherm system.

from Schmersal. This is a safe bolt interlock, which consists of the interlock unit with sensor systems and motor-powered locking bolts, plus the actuator. The actuator contains a coded RFID tag and a locking opening into which the locking bolts engages. As soon as the locking pins have engaged to a sufficient depth in the catch opening of the actuator, the safety mechanism is considered safely locked and the safety outputs are released. The AZM 400 achieves an interlocking force of 10,000 N. "This excellent interlocking force and the user-friendliness of the AZM 400 are among the reasons we opted for this safety device," explains Stefan Zirpel.



Fig. 2: The new AZM 400 solenoid interlock, which is used to secure the Microcut, achieves interlocking force of 10,000 N.

Solenoid interlock with “built-in intelligence”

All “hardware components” are tough and well protected in a rectangular metal housing.

In this way, effective measures are taken to prevent the ingress of dirt in the housing of the interlock when the locking bolt moves into position. Well protected on the inside is the “brainpower”, which works through intelligent evaluation in connection with numerous sensors. In communication with the RFID tag in the actuator, a safety technology-compliant RFID monitors the correct position of the safety doors and enable the locking bolts to be disengaged. This position is monitored by an intelligent magnetic field detection system during the disengage process. This ensures sufficient overlap of the bolt in the locking aperture of the actuator. Among other things, the safe RFID technology enables the user to choose between three types of coding and

thereby determine the appropriate level of anti-tamper protection – up to individually coded versions of coding stage “high” in accordance with DIN EN ISO 14119.

“Another special feature of the AZM 400 is the bistable principle of operation. This means: In the event of a power failure, the solenoid interlock maintains its current position. This is another plus point in terms of safety and user-friendliness, as the user does not need to choose between the working and resting current principle and the safety device is also safely held closed during a power outage when there are hazardous run-on movements,” explains Markus Graßmann, Sales Manager at the Schmersal Group.

High level of safety – high plant availability

“Our internal machine and process monitoring for the VMC 1200 requires a high level of machine safety, and this role is specifically achieved using the AZM 400,” explains Stefan Zirpel. Both the locking and also interlocking function meet PL e and category 4 according to DIN EN ISO 13849-1 as well as SIL3 according to DIN EN 61508-1. This means that even the high safety requirements according to DIN EN ISO 14119 are complied with. The high level of safety for the interlocking function is achieved here, among other things, by the two channel release signal. This ensures, for example, that a cross-wire will not cause unintentional release and thereby allow access to a danger zone. The electronics integrated into the AZM 400 – in conjunction with the sensor systems – enable numerous additional functions, e.g. for recognition error conditions, to increase the availability of the interlock. For example, if the locking

bolt does not reach its “locked” status at the first attempt at locking, a second attempt is made automatically.

Only if this also fails does the device report a malfunction. This reduces the number of error messages and thus increases the availability of the plant. Safety doors are often damped at the end point so that they spring back slightly after closing. This means that the locking bolt is no longer sitting centrally in the locking opening of the actuator and is therefore subjected to lateral forces. If these lateral forces cannot be overcome, the safety door is not opened, with the resulting delays to the production process. “The AZM 400 is a good solution to this problem: The interlock allows locking against lateral forces of up to 300 Newtons,” explains Markus Graßmann. “This also contributes to increasing plant availability.”



Fig. 3: The Microcut is installed in a robust stainless steel casing and has various cutting tools.

Images:

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