

A Sugar Stick Every 0.5 Seconds

Italian filling machine with real-time automation from Rexroth

They can be found everywhere from gastronomy to offices: various forms of sugar packets and sugar sticks are a must for hot drinks. In Europe alone, consumers use several hundred million of these packets every year. At a unit price of under 0.5 cents, low costs and the highest throughput are essential for production. The Italian company M.F. snc Macchine automatiche now offers a new, high-performance machine for filling these small packets. M.F. relies on lean automation from Rexroth with real-time communication via a sercos automation bus.



Flexibility is the key. sercos is already well established in the food and packaging industries

The company specializes in the production of packaging machines to proportion products of various consistencies into individual heat-sealed packets. The machines can deal with all types of products and consistencies, whether granulated, such as sugar, powdered, liquid, or creamy, as well as single units. M.F. has also taken into account the special features found in sugar processing. The small white grains and particles are extremely abrasive and turn into a sticky syrup if there is too much humidity. This is why the Italian packaging specialist has replaced mechanical synchronization elements with individual electric drives wherever possible to increase uptime and reduce maintenance costs.

“The packaging industry often requests individual solutions. This is why we exactly adapt our machines and systems to the customer’s needs,” notes Fabio Fuzzi, owner and Managing Director of M.F. The new metering machine Stick Pack used to fill long sugar sticks offers powerful and lean automation with excellent flexibility at high speeds: It fills up to 600 sugar packets every minute on ten tracks. To change the product to other quantities or packaging sizes, almost all you need to do is select a different recipe in the control.

A working cycle of only 0.6 seconds demands highly precise coordination of the involved servo axes. M. F. relies on the automation solution IndraMotion for Packaging from Rexroth to do just this. Logic and motion functions are integrated in a scalable hardware. For the compact Stick Pack, the owners chose on the variant with an IndraMotion MLD drive-based control. It reduces cabling and the master drive can control up to nine further servo drives. An open PLC in accordance with IEC 61131-3 regulates the process sequence and takes over all visualization of the system. Rexroth has expanded on the embedded motion libraries in the PLCopen with its own functions that are geared towards packaging applications. This means that the IndraMotion for Packaging has replaced much of the complex programming tasks through fast parameterization.

Simple engineering thanks to CamBuilder

The sugar is delivered in sacks weighing between 500 and 1000 kg and is then sent to a funnel via a suction line. A capacitive sensor keeps the funnel filled at the same level throughout operation. The machine stops as soon as there is no more sugar in the funnel to avoid producing empty packets. The sugar goes through the funnel into the metering system. "The sugar packets are filled using a vibrating cup-type volumetric filler, so the product volumes can be easily increased or decreased," explains Fabio Fuzzi. A scale ensures a high level of repetitive accuracy. "With the scale we are able to achieve a tolerance value of one percent," the owner proudly states. The next station is in charge of heat-sealing the packet on up to three sides.

M.F. uses the engineering environment IndraWorks to implement fast and highly-dynamic movements in all axes. It includes all of the required software tools for programming, parameterizing, commissioning and diagnosis of the control and drives. At the same time, innovative functions such as CamBuilder simplify work. The Italian engineers were able to create a quick graphic illustration of the cam disks and the software automatically generated the machine code. If a parameter is changed, the movements of the other axes adjust themselves accordingly. M.F. supplies the Stick Pack with 200 recipes that the user can easily select from. The entire drive data and PLC data is backed up on a memory card.

sercos: redundancy ensures data flow even when a cable breaks

The extremely short cycle time demands hard real-time communication between the control and drives. The sercos automation bus offers the right capacity thanks to deterministic transfer. Above all, it extends the robustness of the machine. The redundant ring structure ensures that communication is maintained even if a cable breaks. If the ring is disconnected, sercos switches directly to a double-line topology. Along with an increasing number of manufacturers, M.F. uses sercos as an automation bus: the Stick Pack links all of the machine peripherals equipped with standard Ethernet via a channel that is separate from the real-time communication.

In addition, the combination of sercos with IndraMotion for Packaging enables integration of further modules, such as box formers or automatic heat-sealing machines, in the process with little effort. To do this, M.F. links the controls of the respective modules to the machine via an Ethernet cable. The connected automation modules are synchronized to the machine cycle via IndraMotion MLD.

For Fabio Fuzzi, the close cooperation with Rexroth had a clear aim: "We are growing along with Rexroth. Our products are always innovative and we are constantly faced with change, which is necessary to get ahead. Thanks to this cooperation we are able to integrate innovations right away in the next machines." ■

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