From dough to ready-to-bake croissant

Thanks to state-of-the-art control and drive technology, Fritsch can guarantee increased productivity and flexibility and consistently high-quality croissants at the same time. The company’s latest production line stands out due to the modular Sinamics S120 series converters and a high-performance Technology CPU, which precisely synchronizes a dozen real axes via several virtual axes at variable speed.

The processing steps – from dough cutting to turning and separating to the transfer of the ready-to-bake pieces of dough onto baking trays – demanded significant technical know-how from Fritsch.
Up to 25,000 standard or 50,000 mini croissants per hour – with these numbers, the production line of Fritsch GmbH based in Markt Einersheim, Germany, has reached a production capacity that very few manufacturers of bakery systems are able to achieve. An improvement in the Impressa croissant line made this possible. Instead of mechanically linked units, the highly flexible Fritsch MTR molding and turning system, which is driven by individual servodrives and suitable for maximum production speeds, was used here for the first time.

**Cutting-edge automation**

With increasing production speeds and larger amounts of dough in the system, the demands on control and drive technology increase as well. It must be possible to continue the production flow after a possible disruption at any point; however, synchronization is more challenging than with easy mechanical processes. “We have therefore been solving these demanding challenges with high-performance controls such as the Simatic S7-317T Technology CPU for several years. This is very efficient and economical,” explained Peter K. Leimeister, head of the electronic software department at Fritsch.

**Consistently high quality guaranteed**

The challenge faced by Fritsch GmbH lies in the steps from dough feeding to the transfer of the formed, ready-to-bake pieces of dough to the adjacent ovens and freezers. It is necessary to optimize the individual steps and harmonize them exactly. It must also be possible to easily balance possible fluctuations in the process. The entire process is controlled by a single Simatic S7-317T2DP T-CPU, which coordinates the interaction of 12 real drive axes via several virtual axes.

The Fritsch software engineers make use of technological functions such as synchronous operation, camming, and occasionally also output cams to be able to provide optimum production conditions for different products at variable speeds, and therefore consistently high quality. “Synchronization of the cutting cam with the variable belt speed and with different tools posed the greatest challenge here,” explained Leimeister. “We used a combination of two mating cams in the Technology CPU to make the cutting tool synchronize perfectly with the conveyor belt.” The linking of the alignment belt drives at synchronous operation – where the distance between rows can be varied – ensures an exact transfer of the rolled croissants into the molds of the baking trays. The conveying system for baking trays is electronically linked with this step so that the molds are waiting under the products at exactly the right time. The motion control and technology functions are bundled in the form of PLCopen-compliant function modules in the Simatic S7 technology library, which integrates seamlessly into the Simatic Step 7 engineering system.

**Drive technology from a one-stop shop**

Modular Sinamics S120 converters, which communicate with the control system via isochronous Profibus, are used to translate the T-CPU’s calculations into precise movements. Isynchronous Profibus enables fast, distributed axis control in large systems. The Sinamics drive line-up features a mutual infeed unit, the so-called Active Line Module, two CU320 control units, and several power elements (single- and dual-axis motor modules). The modular structure enables quick exchange of individual components and increases the availability of the overall system. Using control, drives, and electric motors from a single supplier means perfect coordination without any interface problems – and therefore fast, smooth commissioning. The Drive-Cliq digital system bus used with all Sinamics drive components and the electronic type plate of the consistently used Simotics S-1FK7 servomotors also contribute to this easy integration.

**Proven and successful collaboration**

Fritsch GmbH has been working closely and successfully with Siemens for many years. A dozen Fritsch plants equipped with the Simatic Technology CPU used by leading manufacturers all over the world are proof of this success.

**“Solving demanding synchronizing challenges with high-performance controls such as Simatic S7-317T is very efficient and economical.”**

Peter K. Leimeister, Head of Software Department, Fritsch GmbH

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