

PC-based control ensures the highest precision in doypack production for liquid food products

New generation of packaging machines doubles production speed to 120 pouches per minute

The Octo-1 is a new machine generation from the Belgian packaging specialists Scaldopack for the production of stand-up pouches for liquid foods products. A total of 43 Beckhoff servo drives and motors ensure maximum production accuracy and reliability. Moreover, the comprehensive digitization of the machine demonstrates Industrie 4.0 concepts in practice.





The Octo-1, developed by Belgian packaging machine builder Scaldopack, is a system for the production of stand-up pouch packs.

Stand-up pouches, also referred to as “doypacks”, are becoming increasingly popular for packaging of beverages and liquid foods such as soups. The aroma-proof lightweight packs provide benefits from ecological and economic perspectives, since they consume less material than PET bottles, for example, and are easily recyclable. In addition, the stand-up pouches are easy to fill in production facilities and just as easy to present on store shelves. The easily resealable packaging offers further benefits for consumers.

“The production of stand-up pouches requires high process accuracy and therefore places substantial demands on the automation technology used,” says Harald Saelens, Managing Director of Scaldopack. After three years of development, the company created a machine solution that uses advanced servo drive technology from Beckhoff and fully exploits the benefits of digitization: From each pack that is produced, almost 4,000 measured values are stored in a database. The machine settings themselves are also stored in a database and retrieved automatically at the start of each production run.

PC-based control platform with integrated servo drive technology guarantees high-precision positioning

“Due to the modular design of the Octo-1 and its PC-based automation platform, production steps can be adjusted quickly and efficiently to achieve

varying pouch types or closure systems,” points out Harald Saelens. The starting point for the production of doypacks are plastic pouches which are already sealed on three sides. The machine picks up the pouches, opens them and attaches the closure. A C6925 Industrial PC (IPC) from Beckhoff with TwinCAT automation software and EtherCAT as the communication system provides advanced centralized control. A PLC cycle time of 2 ms is required in order to support the registration of the measured values and other tasks. Various third party-components, such as load cells and cameras, are integrated into the controller via the EtherCAT network. The TwinCAT NC Camming Motion Control library also runs on the same CPU. A total of 43 axes are synchronized with a cycle time of 250 ms.

“The Beckhoff AX5000 Servo Drives with integrated safety functionality and AM8xxx series servomotors controlling the sealing process are equipped with high-precision external encoders with a resolution of a few tenths of a micron. They provide precise feedback covering everything that happens in the machine; each step can be accurately controlled and corrected.” When a pouch is picked up, its exact position is measured with photocells. The nominal and actual positions are compared when the closure is applied in the next step. If necessary, the pouch position is adjusted in order to enable precise sealing. “The machine is able to detect any deviation in the production process,” says Harald Saelens.



Plastic pouches are automatically fed into the Octo-1, where caps or spouts are applied.

"For example, the machine detects film overlaps or missing material, in which case the product is rejected."

Optimum process control ensures top quality

Instead of a visual inspection of the end product, which is still the preferred method of quality control for many conventional packaging machines, the Octo-1 continuously monitors each process step. In this way, higher reliability and quality of the pouch packs can be guaranteed, since faults can be detected that otherwise may be missed by optical sensors. Moreover, the number of rejects is reduced, since the machine can use the measured values to adjust the parameters for the subsequent production steps.

Harald Saelens: "Most of the 4,000 measured values are acquired during the sealing of the closure. All positions are recorded every 2 ms, providing visibility of the complete profile of the sealing process, which leads to perfect control over the process." The large data quantities generated by the machine are compiled in CSV files that the C6925 IPC sends to a data server. From there, the machine can retrieve the settings parameters.

Servo drives double production speed to 120 pouches per minute

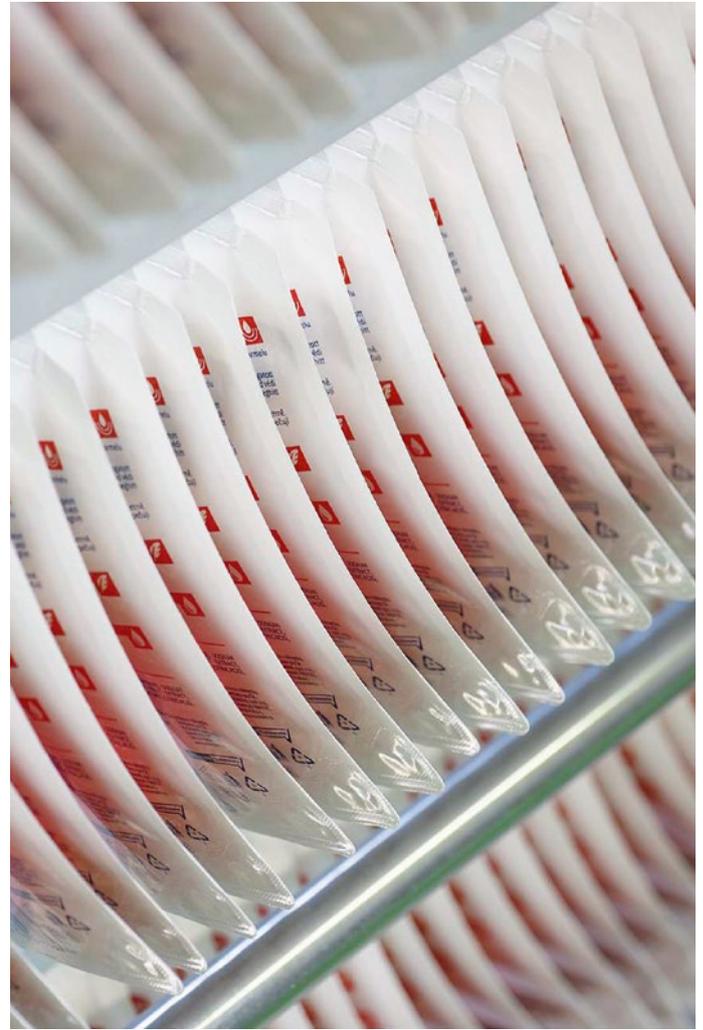
"The output of the Octo-1 is much higher than that of a conventional machine," says Harald Saelens. "We can produce 120 pouches per minute, compared with machines that have mechanical and pneumatic drives which provide an output of 40 to 60 pouches. The additional investment outlay for advanced drive technology quickly pays off, not to mention the reduced maintenance effort for the machine. The biggest gain is in the reliability of the production: Recalls due to pouch pack defects are a thing of the past," reports the Managing Director of Scaldopack.

Utilizing multi-core capability

In due course, Scaldopack intends to convert to TwinCAT 3, the latest software generation from Beckhoff, in order to fully leverage the performance of Beckhoff multi-core IPCs. "The separate data server will become redundant in the future – largely due to the fact that we will send production data into the cloud for further analysis, where required," Harald Saelens explains. "For cloud communication and data analysis, we will use the Beckhoff software modules



The modular design of the Octo-1 machine enables fast, convenient adaptation to new products.



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TwinCAT IoT and TwinCAT Analytics, with a view toward reducing production costs and losses while enhancing product quality even further, based on optimum data evaluation."

The machine parameters will remain stored locally, so that data availability does not depend on Internet access. They can be stored easily in the C6925 IPC: The multi-core environment of the IPC facilitates additional functionality without impacting the control performance. Also, the included web server utility will enable local or remote access to the machine database.

Digitization creates new methods of collaboration

"In addition, digitization facilitates new types of collaboration between machine manufacturers and end customers," says Harald Saelens. "It enables us to implement specific customer requirements in a very short time. Plus, we can use production data analysis as a basis to further optimize the machine. The machine automatically retrieves the new parameters from the database, without interrupting production. For new products, we can test packaging processes in-house before the machine is delivered to the customer, so that when it arrives

on-site it runs with optimized settings right away." "We strive to offer this high level of service to our customers – a truly unique selling point," adds Wouter Malfait, Sales Manager at Scaldopack.

Further information:

www.scaldopack.be/en

www.beckhoff.be