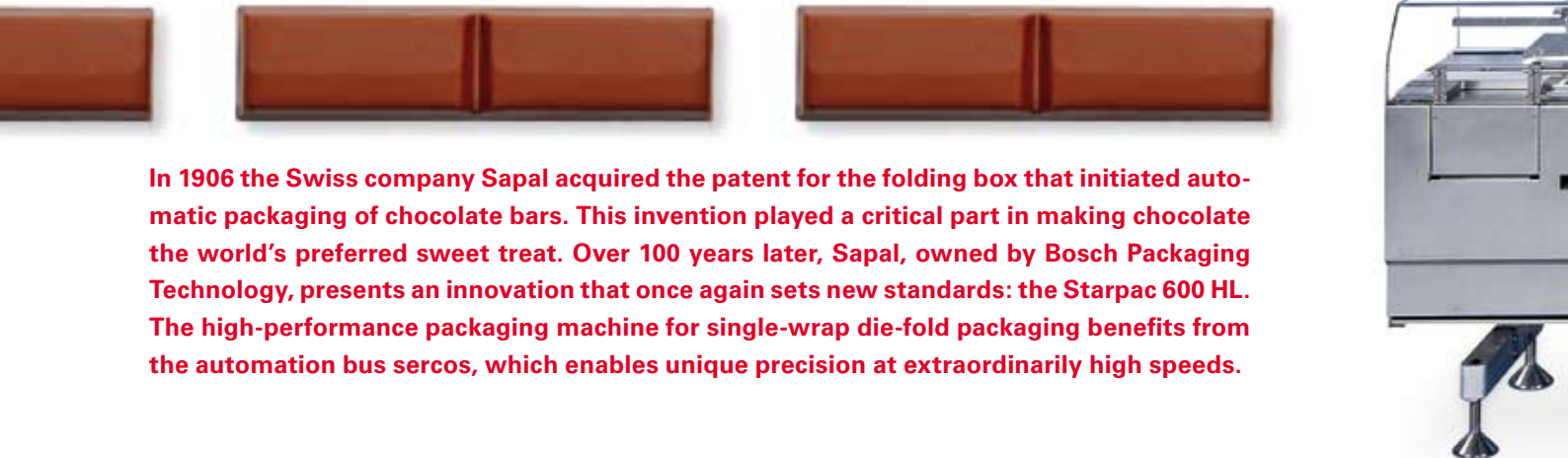


Industrial Ethernet with sercos

The “Sweet Side” of Automation Technology



In 1906 the Swiss company Sapal acquired the patent for the folding box that initiated automatic packaging of chocolate bars. This invention played a critical part in making chocolate the world’s preferred sweet treat. Over 100 years later, Sapal, owned by Bosch Packaging Technology, presents an innovation that once again sets new standards: the Starpac 600 HL. The high-performance packaging machine for single-wrap die-fold packaging benefits from the automation bus sercos, which enables unique precision at extraordinarily high speeds.

Used to package small chocolate bars, the new packaging machine Starpac 600 HL combines the best of two worlds: thanks to hermetic sealing and gentle processing, it maximizes product quality and extends shelf lives. At the same time, precise single-wrap die-fold packaging produces a visual effect comparable to that of premium products.

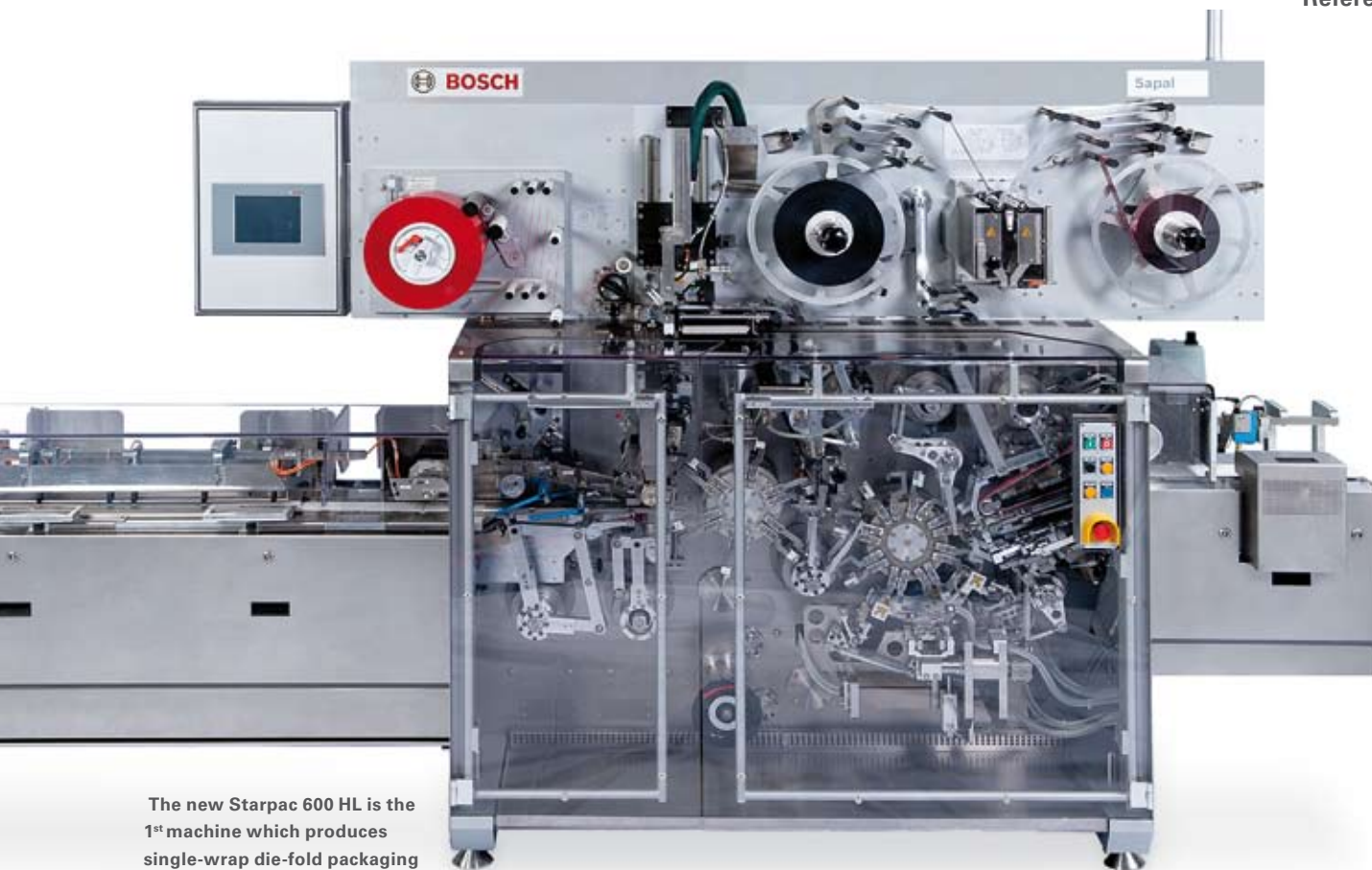
Absolute precision

The centerpiece of the Starpac 600 HL packaging machine is the “folding box,” which is responsible for the high-quality look of the fold wrapping: the small chocolate bars are fed in from the side; two transfer turrets ensure the rapid movement of the product through the folding and sealing process. The folding box implements all folds simultaneously, thus guaranteeing symmetrical side and longitudinal seals. Symmetry can be achieved because even elastic packaging materials are held at a precisely defined position in the folding box. This represents a fundamental difference between Starpac and combined packaging stations which, due to their design, are not able to consistently achieve the precision required for this level of flawless packaging.

High-performance automation

The basis for unvarying symmetry at high speeds is the seamless interplay between the servomotors, drives and pneumatic components from Rexroth, which communicate via the sercos automation bus.

The packaging machine uses specially developed, highly dynamic MSK043 servomotors, which, together with the IndraDrive drives, are able to achieve the extremely short start/stop cycles that are common in this application area. Because the highly synchronous movements inside the folding box demanded bidirectional, real-time communication, sercos was the clear choice as the automation bus for this innovative packaging machine. Thus, it was quickly apparent to the developers that simply forwarding a specific position to the drive control would not be enough. Only by ensuring that the drive reaches its exact position, even with the added element of elastic packaging material, can the highly complex packaging process be carried out with the desired level of precision. sercos already supports standard real-time Ethernet in accordance with IEC 61158 and 61784 and was thus able to fully comply with the developer’s rigorous demands.



The new Starpac 600 HL is the 1st machine which produces single-wrap die-fold packaging with hermetic seals

Real-time control

An IndraMotion MLC motion-logic control system from Rexroth is implemented to control the drives, pneumatic components and I/O bus couplers, thereby permitting the regulation of up to 64 drives. sercos is "on-board" as part of the standard equipment for all components – additional hardware, e.g. converters or similar components, is not required. The automation bus allows the control to achieve high-speed cycle times. The minimum update time for the drives, for example, is just one millisecond; i.e. in this interval the control can retrieve information from the drive and reset its parameters. sercos makes it possible for each axle on the Starpac 600 HL to be individually queried in real time and adjusted using new parameters if necessary.

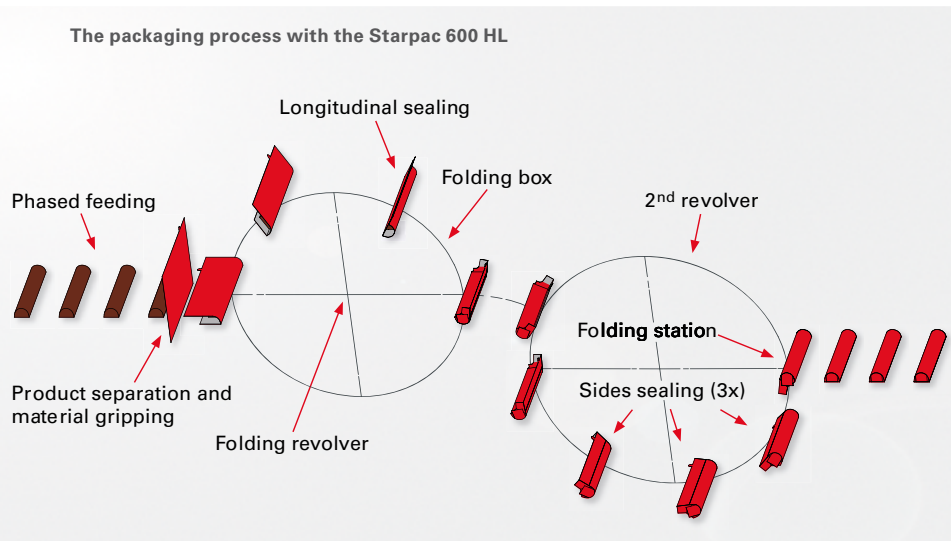
All relevant data are transferred in real time via sercos. Without the real-time communication of all time-sensitive processes, high outputs could not be achieved. Because the modular pneumatic valve terminal system HF04 is also equipped with sercos, the Starpac uses sercos as its sole automation bus. This reduces the number of different field bus systems and the amount of wiring needed. For networking, sercos uses standard Ethernet components which have proven themselves in numerous industrial applications.

You'll never walk alone

The hit from the Broadway musical Carousel is not only highly popular in soccer stadiums around the globe. For the planning and operation of systems and production lines, a seamless interplay of all components is essential to success. Bosch Packaging Technology therefore designed the new packaging machine to enable optimum integration in production lines. The feed system, for example, has a modular structure. The feed section can have different lengths depending on the speed at which the chocolate bars are fed in. Local I/Os, also connected via sercos, guarantee precise, consistent spacing of the incoming products.



Highly dynamic servomotors for extremely short start/stop cycles



With the open-style, modular concept, solutions for secondary packaging – in cartons or trays, for example – can be provided by Bosch Packaging as well as third-party manufacturers.

Because the components are usually equipped with a separate control, a central line control is responsible for the transfer of important information – e.g. “stop” – if machine failure leads to a production standstill. The communication of the line control is often implemented based on Ethernet TCP/IP socket connections. The use of sercos lends itself here as well: a PLC system such as IndraLogic XLC from Rexroth enables real-time communication for the entire system via sercos, which in turn contributes to increased operational safety.

Safety first!

Compared to previous packaging machines, the extraordinary output of up to 600 units per minute makes it necessary to implement corresponding safety measures for the Starpac 600 HL in order to prevent damage to the machine, for example due to blocked drives or jammed parts. Drives from the IndraDrive series from Rexroth thus provide TÜV-certified safety functions. They guarantee, among other functions, a secure rotating direction (e.g. always clockwise) or a specific, pre-defined speed if the machine is in service mode. Actuation currently still occurs via sensors and actuators that are wired directly to the drives. The CIP Safety protocol on sercos will replace this discrete “wiring” in one of the next expansion stages. With the next configuration, an additional safety bus will be omitted since the safety-relevant signals will simply be clocked into the sercos automation bus in real time alongside the standard data. Because sercos supports the ODVA machinery initiative as a partner organization, users receive access to a modern, highly capable safety network, as well as the option to integrate

their machines simply and easily in production processes and system structures at customer sites.

Efficient engineering

The engineering framework IndraWorks from Rexroth provides a software environment that allows all tasks from planning and programming to the visualization of user interfaces and diagnosis to be consistently mapped in a single tool. With IndraWorks, developers have quick, transparent access to the functions and data for all components. Components that are connected via the sercos automation bus, such as IndraDrive drives, are detected automatically and integrated in IndraWorks – a significant advantage, especially in the engineering phase. In this vein, during the development of the Starpac 600 HL, the movement and PLC functions of drives and pneumatic components as well as the configuration of decentralized I/O modules could be fully implemented within a uniform software environment, thereby reducing development time considerably. The integrated project management is multi-user-capable, which simplifies engineering in teams.

Conclusion

Automation tasks in the field of packaging are becoming increasingly complex. A flexible automation bus such as sercos simplifies engineering and ensures that the operation of high-performance applications is both failsafe and low-maintenance. ■

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