

Open Control for More Efficiency

Thermoforming on the Way to Digital Transformation

With the transition to the new Simatic Open Controller generation, Gabler Thermoform is upgrading their machines to provide increased performance and more efficiency. This will represent the first step toward digitalization for the North German company, and a new dimension of customer support. The availability and productivity of machines will be bolstered as a direct result of precisely plannable maintenance work.



The extended machine functionality of the new thermoforming line can be safely controlled by a single operator using the Simatic HMI comfort panel © Siemens

Situated in Lübeck, Germany, Gabler Thermoform GmbH & Co. KG is one of the global leaders in the manufacture of thermoforming machines for food packaging. For many years, the North German company has relied on high-performance control technology and Siemens expertise in the automation field. In order to take advantage of the continuous further de-

velopment of hardware and software, it was in the interest of both parties to find a future-oriented follow-up solution for their proven control system. As well as retaining all established functionalities, this should at the same time provide a whole lot more, ideally with added performance and increased efficiency, as well as being more user-friendly and cost-effective.

Flexible Mechanical Engineering with Open Control

Gabler Thermoform's response is the multiply enhanced, all-round Swing3 thermoforming machine, which celebrated its global premiere at the K trade fair in Düsseldorf, Germany (Fig. 1). The engineers from Lübeck expanded »



Fig. 1. Swing 3: the all-round thermoforming machine from Gabler Thermoform with control technology from Siemens © Gabler

upon the basic principle with a tilting table and proven stacking/counting mechanism. The drive concept of the larger M line from Gabler was transferred for the very first time to a Swing machine, effecting the hoisting/tilting movement using only one motor rather than two. Perfected in an array of diverse applications, the interaction of all core components facilitates a highly flexible production of deeper products such as bowls and cups, but also flat covers and coffee capsules on a single machine, with optional horizontal or vertical stacking at the outlet. This flexibility is supported by an integrated tool-changing system. Featuring a considerably larger 600 x 271 mm forming area and more than twice the punching force with 290 kN, throughput is markedly increased on the trim-in-place machine.

This also allows products to be made from more demanding materials such as PET, recyclable and biodegradable plastics to be manufactured reliably on large multicavity molds.

Open the Digital Future

“We were looking for a high-performance and cost-effective control solution which would favor a quick and simple introduction to digitalization following the generation change,” explains Per Gendensch, Head of electrical engineering and development at Gabler Thermoform. A conscious decision was therefore made for the Simatic ET200SP Open Controller (**Fig. 2**). This open “all-in-one” control offers all of the functions and capabilities required for efficient thermoforming. An integrated PC-based soft-

ware controller manages deterministic tasks such as visualization, as well as centralized, modularly scalable input and output modules (I/Os). In addition, a completely independent runtime environment is provided for digitalization applications.

The software version of the fail-safe Simatic S7-1500F is preconfigured at the factory and is primed for the most demanding PLC tasks, including safety functions. Centralized and decentralized expansion of the PLC system with additional I/O modules is possible for more complex solutions. Modern communication standards such as Profinet and Gigabit Ethernet facilitate integration in existing structures.

This type of openness and scalability ensures that custom-tailored, but in any case cost-optimized automation solutions can be implemented for the most diverse applications. On the first Swing3, the Open Controller coordinates the interaction of foil extractor, heat emitters, wrapping arms, tilting table, pressure and vacuum control, ejectors and stacking/counting unit. Moreover, simple linking with upstream and downstream system components such as preheating, additional automation (handling), or regranulation mill is also guaranteed.

Revised User Interface

The HMI system of the Swing3 is now software-based on the Open Controller and all functions have been completely modernized by the machine manufacturer. In place of the previous key panel, a Simatic HMI Comfort Panel with a larger 15” touch display now allows intuitive, graphically-supported, and thus extremely user-friendly operator control and monitoring (**Title figure**). As confirmed by the sales manager Carsten Stöver, “The new, flat operating structure allows safe operation with the enhanced machine functionality by a single user.” For example, plausibility checks will prevent incorrect operator entries leading to faults or even damage to equipment. And in the event of an error, a graphical view of the most important machine parts will quickly localize the respective location of the fault, in turn helping to minimize downtimes.



Fig. 2. A Simatic ET 200SP Open Controller from Siemens coordinates the interaction of all components in the thermoforming machine © Siemens

Cloud-Based Condition Monitoring

The easily networkable control system is predestined to continuously record operating and process data, which can then be used for analyses. Gabler takes this even one step further by integrating a hardware-based Simatic CMS 1200 Condition Monitoring System and special sensors for the very first time. The CMS X Tools software for the analysis and monitoring of forces and vibrations on a Simatic IPC227E completes this Siemens solution. The objective here is to predict the occurrence of imminent problems as accurately as possible, for example based on changing vibrations of a drive or force characteristics during the punching process, and to be able to notify the operator of these problems in good time. This permits the scheduling of maintenance work and further reduction of undesired interruptions in production flows.

Gabler demonstrated the tremendously diverse possibilities of this approach at the K fair: using a customized dashboard, which can be called via the open, cloud-based MindSphere ecosystem, both locally on the control panel of the machine and also globally over network-capable, even mobile devices (Fig. 3). By way of example, it visualizes important KPIs (Key Performance Indicators) in compressed form, current machine and process data, fault and error messages, as well as maintenance-related status data. A MindConnect Nano device (Fig. 4) in the centralized control cabinet ensures reliable data transfer between machine and MindSphere. Furthermore, via a VPN tunnel the developers from Gabler can access the control system, call data, and support the user as required.

The Simatic ET 200SP Open Controller can be configured quickly and



Fig. 3. Portable comfort panel: the Gabler dashboard developed in cooperation with Siemens visualizes machine and process data via the open, cloud-based software system MindSphere

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easily for various requirements and may also be subsequently expanded. Deterministic PLC tasks and PC programs, including diverse auxiliary tasks, run independently of one another in individual storage areas, providing extremely high overall performance and stability. Once optimized, system configurations can be transferred to the control systems by any Gabler service technician and installed with a single mouse-click, allowing considerably quicker and easier commissioning down the line. Likewise updates, which can be forwarded to customers on USB flash drives and installed by them without any in-depth know-how of IT or control systems. This saves numerous service calls and the associated expenditure of time and expenses incurred.

Per Genendsch affirms, "Bundled with the Simatic HMI Comfort Panel, the Open Controller is currently the most compact, complete and economical solution for Gabler machines." ■



Fig. 4. Control cabinet: the compact Open Controller (left) integrates the functions of a PC-based, fail-safe software controller. Secure data transfer between the machine and the cloud-based software system MindSphere is realized by a MindConnect Nano-Device (right) © Siemens

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Service

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