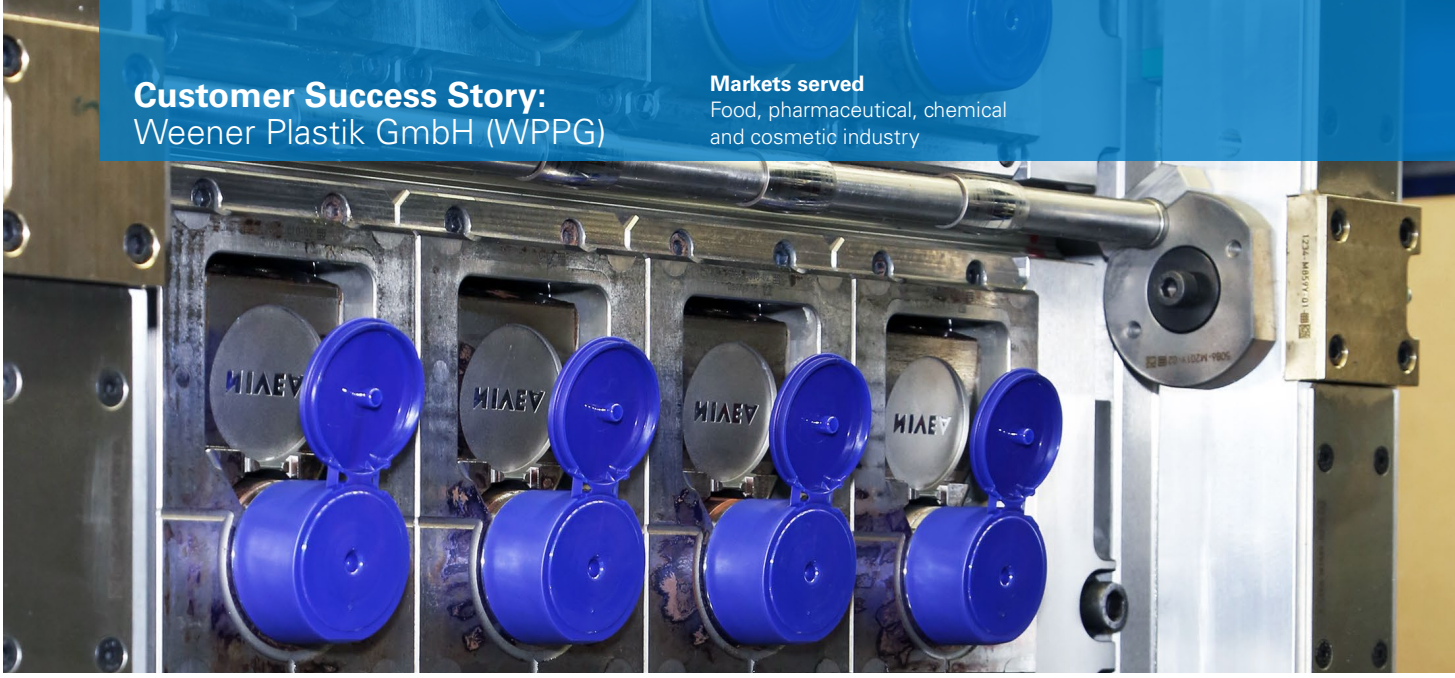
Customer Success Story:
Weener Plastik GmbH (WPPG)

Markets served
Food, pharmaceutical, chemical and cosmetic industry



It's the tool that really counts

Location:
Weener, Germany

Segment:
Machine Building

Problem:
Electrical simultaneous control of two servos for complex cap closing

Solution:
XV-102 HMI/PLC with XI/ON and CAN communication module

Results:
The electrical and freely programmable position control of the servo controllers using the XV-102 shortens the cycle times in closure production and reduces the amount of rejects. System adaptions and maintenance are also simplified, and considerable energy savings are possible compared to pneumatic or hydraulic systems.

"We have calculated that by changing from a hydraulic to a partially electrical system with the Eaton controller for the capping device, it is possible to reduce energy consumption by 65%."

Günter Rieken, global manager for production at WPPG

Background

WPPG is headquartered in Ween of Northern Germany and develops and manufactures innovative plastic packaging for a wide variety of markets and customer segments. The company is regarded as a specialist in customized solutions. This is particularly due to the fact that the East Frisian company is one of the only closure manufacturers that produces its own tools for injection molding machines internally.

A closure is produced in the following way: the injection molding machine presses the two-section product-specific mold firmly at contact pressures of around 350 t. The liquid plastic is then injected at a pressure of up to 2,000 bar. The last process step in which the finished open closures are closed precisely is particularly critical. This operation is challenging since the material shrinks on account of factors such as temperature, air humidity or color. Material damage may even occur during the closing operation.

Challenges

A special tool called the capping bar, is used for the closing operation. The actuation of the capping bar previously had to be implemented with energy-intensive and wear-intensive pneumatic or hydraulic systems, which could only be moved to end positions. In order to ensure the clean closing of the cap, the capping bar must be adapted for each individual product. If the setup of the system is not perfect, it will result in a high rate of rejects. With product adaptions or new production lines, WPPG was previously forced to produce new molds each time and adapt them to the application through lengthy tests with different mechanical variants.

Due to the increasing demand of customers for more efficient and fully electrical machines, WPPG decided to gradually upgrade its tools for compatibility with electrical controllers. This began with their capping devices, and they chose to seek out Eaton for collaboration.

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Solution

The result of the joint development was very successful: two electrical servo drives for positioning the capping bar are controlled simultaneously by Eaton's XV-102 HMI/PLC, which can be programmed by the globally established Codesys standard. One drive handles the vertical movement and one handles the rotation. The control and visualization unit can now set a target curve by which the drives carry out the closing operation at maximum speed and with great precision. The controller compares the target and actual positions of both drives at a cycle rate of less than 2 ms and determines the further positioning of the capping bar.

The 7" touch screen enables curve positions, accelerations, speed and braking to be specified for each position of the servo drives. In this way it is possible to create capping curves matched precisely to the application. This in turn ensures a greater precision in the positioning of the capping bar and a more efficient capping process.

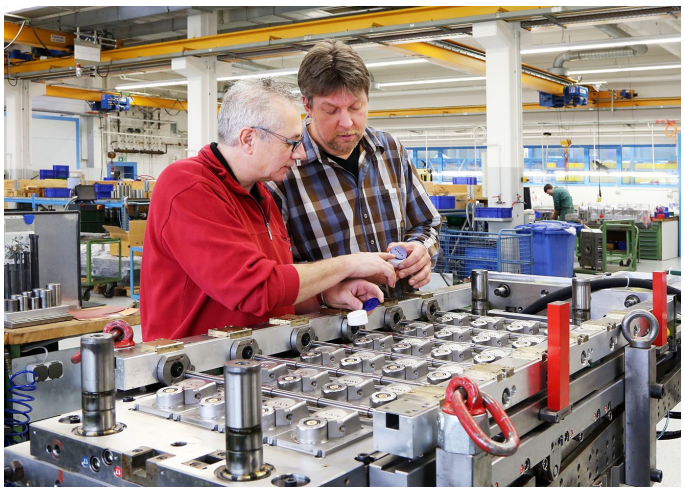
Eaton integrated a communication module in the XV-102 that enabled direct communication via CAN specifically for the data exchange with both servo controllers. The data exchange with the guard door locking system, the position sensors, or between the tool and the injection molding machine was implemented with Eaton's modular XI/ON I/O system which is fitted with a CAN fieldbus coupler. Eaton developed the Codesys program in close collaboration with WPPG specifically for the application. This enables service technicians worldwide to operate and set parameters easily if any specifications such as material or color of the plastic are changed.

The new controller has also simplified maintenance. For example, the status of the connected components can now be examined easily through color displays in a graphic overview. In this way, any mechanical and electrical faults can be identified quickly and easily during the process. A cycle counter also enables the system to indicate the scheduled lubrication of the servo motors. Technicians then have ten days to complete the maintenance work. If this does not take place, the machine shuts down until the maintenance is carried out.

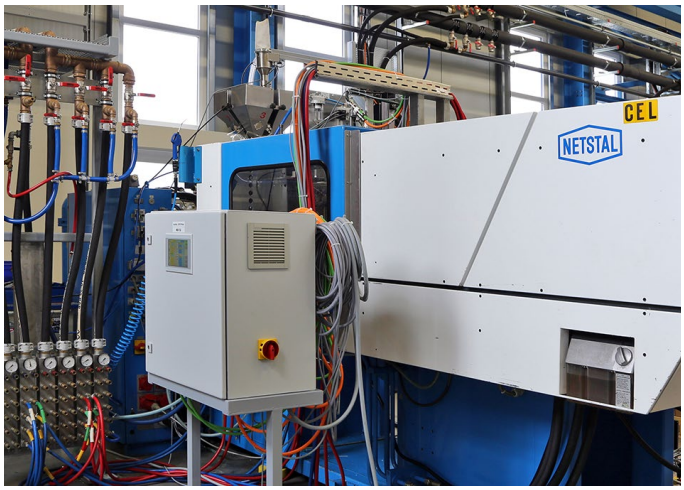
Results

The XV-102 is a lean automation solution that handles the demanding and simultaneous control of the high precision speed servo drives of the capping device: Cycle times, rejects and energy consumption are reduced, while flexibility and productivity have been increased. Machine wear has also been reduced and the application is oil-free. The Eaton controller has now become standard equipment in new machines for a wide range of applications in the entire Weener Group.

"With the successful development of an electrically operated capping device we are the first to offer it on the market. We have calculated that by changing from a hydraulic to a partially electrical system with the Eaton controller, it is possible to reduce energy consumption by 65 %," states a delighted Günter Rieken, global manager for production at WPPG. "Through the outstanding price-performance ratio of the XV-102 and the wide range of benefits for daily operation the investment in the new system has been worth it. We are therefore keen to pursue the course we have taken and integrate other process steps in the Eaton controller."



At its German headquarters, WPPG produces its own tools for its injection molding machines.



The switch cabinet also contains Eaton's XI/ON modular I/O system which handles the data exchange with the locking system of the guard door, the position sensors or between the tool and the injection molding machine.

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