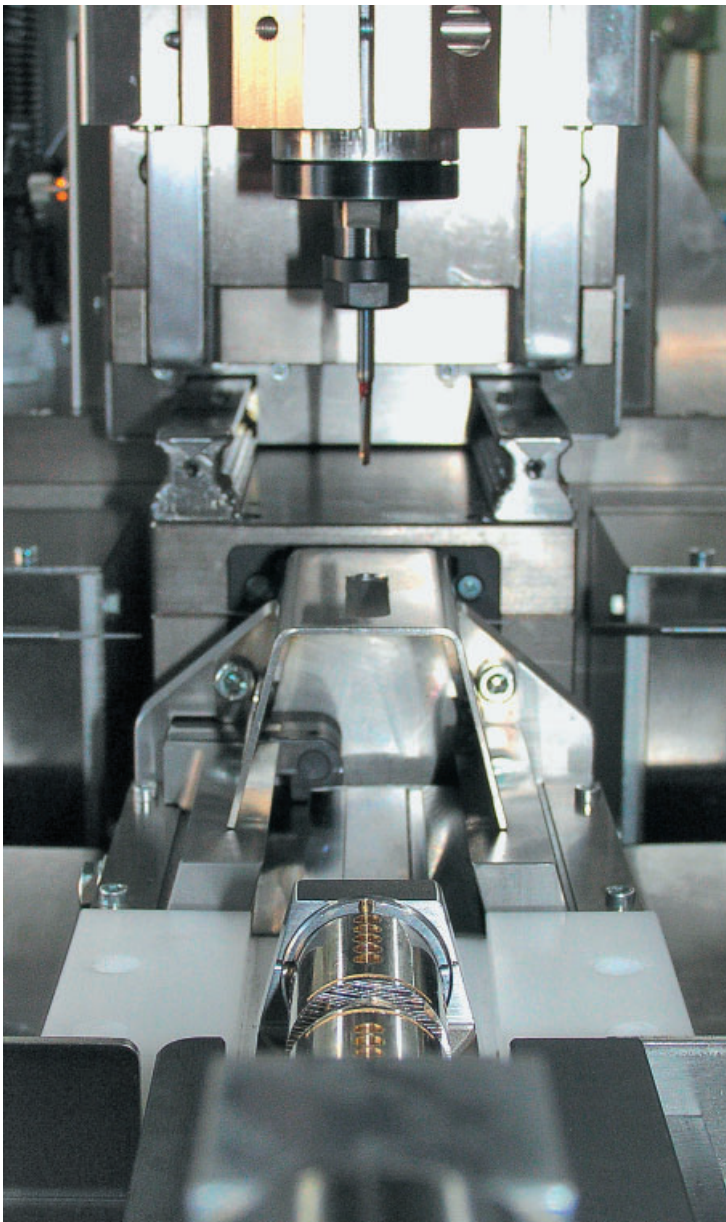


High-precision cylinder drilling

The requirements for locking systems in buildings and other installations are higher than ever today. Implementing sophisticated safety measures efficiently requires innovative machines with software concepts to match. Following a commission from the Swiss company Keso AG (experts in modern locking systems for over 45 years), SEH GmbH developed a high-precision drilling robot for cylinder locks. The software concept comes from Mabag AG, and the control and drive technology was developed by Beckhoff.



In the past, special machines manufacturer SEH GmbH, based in Widnau, Switzerland, worked with various control equipment suppliers with the result that very different drive solutions were often used. The Keso AG order to design a new, automatic drilling machine for their cylinder locks brought about a system change for SEH. "In the middle of 2006, this high-tech order prompted us to make the landmark decision that going forward we only wanted a supplier who could deliver the complete automation solution from a single source. We opted for Beckhoff," explains Guido Herzog, mechanical engineer and managing director of SEH GmbH.

The highest precision with the greatest possible flexibility

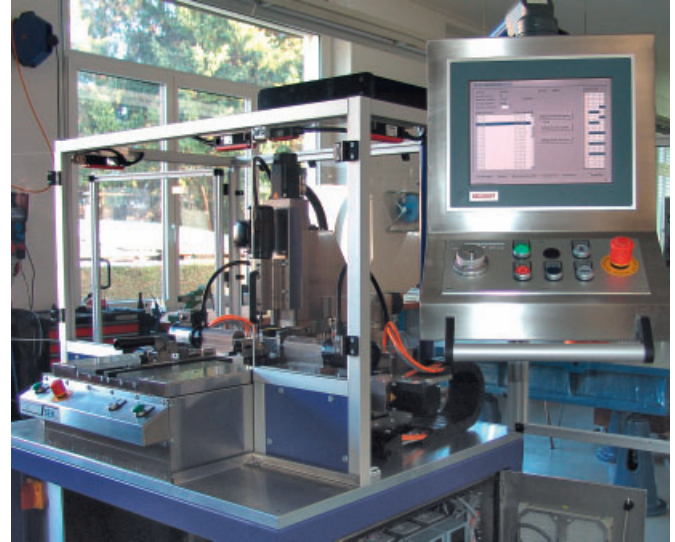
The new special machine drills precise holes for the bolts used in the cylinder locks. The stepped holes have to be accurate to \pm a hundredth of a millimeter both in depth and with regard to their X-Y-Z-coordinates. For this reason, it is important to keep the servomotors' accuracy within a thousandth of a millimeter. "This gives us ten times higher resolution than our specifications require," says Herzog.

Keso AG were already using CNC machines for the stepped holes in the cylinder locks before then; however, the angles had to be adjusted from 0 to 4.5° mechanically. This necessitated changeover times of 40 to 45 minutes; in addition, there was the potential for waste of as many as four to five cylinders. With the newly developed machine, changeover time – including importing the data and adjusting the drill – is about thirty seconds. There is no longer any waste – even the first cylinder is always useable.

The precision drilling machine features 10 CNC axes in total which are controlled via TwinCAT automation software from Beckhoff. There are also two more axes for adjusting the angles and the height which are equipped with the smallest servomotor in the Beckhoff range. It has a flange size of 56 mm and is about 120 mm tall. The small motor even has a built-in brake. Five servomotors with resolvers and brakes are used altogether, since it must be possible to stop the Z axis in an emergency. Furthermore, the angle setting can be adjusted via the brakes. "The motor that is put under the greatest strain is set to 50 percent of its rated output at most. All the other motors have the same output, even if they are not used to their full capacity. This provides the great advantage that the



Guido Herzog, mechanical engineer and managing director of SEH GmbH, Robert Schär, managing director of Mabag AG, and Stefan Keller, Beckhoff Switzerland



servomotors can be interchanged without any problems in the event of a fault," explains Guido Herzog.

Everything under control – thanks to integrated automation solution

Key data are stored in a database on Keso AG's server. They can be transferred directly – via bar code – to the controller via a defined interface. In addition to flexibility and adaptability, problem-free data transfer is one of the greatest advantages of the PC-based controller. "Such simple integration may well cause difficulties with another controller," says Robert Schär, managing director of Mabag AG, who compiled and implemented the custom software for this drilling machine. Guido Herzog adds: "Apart from the three high-frequency spindles, all the components, including the controller, the display, the servomotors and the software are from Beckhoff. With the automation system from Beckhoff, we have everything under control: path, power and torque. We can track and control everything at any time. We can even identify wear on the machine."

Future prospects

The current drilling machine is already the second ordered by Keso AG. "The first machine has been in operation for a year and drills around 2,000 cylinders in 12 hours," explains Robert Schär. Guido Herzog adds: "This machine drills significantly more cylinders in the same time and does so with greater precision than its predecessors."

Moreover, according to Robert Schär, the machine developed for Keso AG has led to further orders: "It looks as if SEH will be supplying car manufacturers throughout Europe with new machines. All car makers have their own locking system. We at Mabag will see to the programming. Thanks to Beckhoff, it will then be possible for us to access the customer's server directly in the event of a fault. We will be able to analyze the fault and begin remote maintenance immediately."

Keso AG, security systems www.keso.com
 SEH GmbH www.seh-gmbh.ch
 Mabag AG www.mabagag.ch
 Beckhoff Switzerland www.beckhoff.ch



Beckhoff components

- | 1 CX1020, modular DIN rail Industrial PC with TwinCAT NC PTP and Windows XP Embedded
- | 1 CP6901, 12" DVI/USB built-in Control Panel with touch screen
- | 2 AX2513-B200 servo master modules, 3 A, Lightbus
- | 8 AX2523-B200 servo axis modules, 3 A, Lightbus
- | 6 AM3041 servomotors
- | 4 AM3021 servomotors
- | various I/O terminals