



Bruderer AG: XFC for punching machines

Future-proof PC controllers

→ Punching machines have an expected lifetime of 25 years or more, while industrial controllers tend to last about ten years. This time gap can be closed with PC-based controllers. PC technology from Beckhoff Automation guarantees long term availability, high computing power and optimum portability.

The automatic punching machine built by Bruderer performs up to 2,000 strokes per minute producing plug contacts, rotor plates or screening for mobile phones – 24 hours a day, 365 days a year, for up to 25 years. The controller monitors and controls system operation in order to ensure high manufacturing quality. With a long standing reputation in automation, Bruderer from Frasnacht, Switzerland, has been using electronic controllers since 1985 and PC-based controllers from Beckhoff since 1998.

Increasing the lifetime of the control system

Many of the electronic parts in the first CNC controller from 1985 are today no longer available, even as a “legacy product” charged at several times the original price. The fact that electronic components have become shorter and shorter lived intensifies this problem. This is a heavy burden for control system manufacturers because they generally guarantee system availability for 10 years. After the decision to launch a new control system, it takes around four years of development before a new punching machine featuring the new system appears in the market. The fact that Bruderer offers support for its machines for ten years results in a potential gap of four years of electronic component uncertainty.

Several options are available for bridging this gap. One solution would be to purchase and store sufficient spare parts in a timely manner. Of course, this option is expensive, requires plenty of storage space and is uncertain because it is impossible to predict exactly how many components of each type will be required. The second option, which is used by the punching machine specialist, uses PC-based controllers. It enables the service life of the machine to be extended based on the same technology, but perhaps with different, yet still compatible components.



PC controller for
punching machines from
Bruderer AG



Continuity in a highly dynamic market

Machine lifecycle management is becoming increasingly important for machine builders to succeed. Many manufacturers seem to forget that new products can create future problems that have to be solved in 10 years' time or less. Bruderer, therefore aims to offer robust long-term control hardware solutions. All punching machines, dating back to 1999, can be controlled and operated with the current, Windows-based PC controllers. This platform should be possible for several years to come. With a PC-based methodology, life cycles far beyond the standard 10 years for electronic components can be achieved.

Servicing of machines also plays a significant role in life cycle considerations. PC-based Bruderer systems have been used for eight years in conjunction with associated user training. Worldwide service could be difficult to organize if the system changed continuously. In addition, a lot of know-how could be lost if a new system with a new programming language or hardware were introduced too soon.

Bruderer's strategy involves strong vertical integration in order to achieve maximum independence and availability of spare parts. The punching machine manufacturer produces all main components in-house. This means that 95 % of all components ever produced are available as spare parts. Development and production of Beckhoff Motherboards is based at Beckhoff facilities in Germany. If, for example, a processor is discontinued, Beckhoff can either store an adequate quantity of this component or design a replacement processor within a relatively short amount of time.

Small controller – high performance

The latest product from Bruderer demonstrates the impressive scalability and software compatibility of Beckhoff PC controllers – seamlessly from compact Embedded PCs to large Industrial PCs. The new punching machine, which is equipped with a CX1020 Embedded PC from Beckhoff, uses the same TwinCAT control software that Beckhoff developed for Industrial PCs. All Bruderer punching machines use the same software, regardless of which Beckhoff control system is used. TwinCAT software is always backwards compatible, i.e. the latest version also runs on older machines. The same software can be used even if the Industrial PCs use different operating systems such as Windows NT, Windows 2000, or Windows XP. This means that all machines are operated in the same way, even if

a customer uses different generations of punching machines. The only possible constraint for TwinCAT updates is that the PC processor has to have adequate performance.

The new Embedded PC-based control system also indicates how quickly computing performance is increasing (and shrinking in size). Despite the fact that it is significantly more compact than the previous device, the IPC-based "B controller" offers the same performance with a 1 GHz Intel® Celeron® M ULV processor. In addition, it requires no rotating components such as hard disk or fan, which improves stability and reliability.

Just as the compact Embedded PCs are becoming faster, the performance of the Industrial PCs from Beckhoff also continually increases. The new dual core-based motherboards double the computing power at a stroke. The two computation kernels enable parallel processing of complex visualizations with sophisticated graphics and control processes.

Market edge through XFC

Thanks to EtherCAT – the real-time Ethernet fieldbus – the dimensions of the controller have been reduced to a minimum. Up to now, almost all slots of the punching machine control system were occupied by fieldbus cards: one for I/O, one for the cam group, plus a modem card. These functions can now be combined as I/O terminals linked via EtherCAT and connected directly to the control system, which saves valuable space.

So far Beckhoff has implemented the control software for the cam group of the punching machines based on Bruderer know-how. The control system for the cam group currently runs in a special run-time system with a cycle time of 80 µs because before EtherCAT was used, the fieldbus limited the cycle time of the software PLC to 2 ms. Now with EtherCAT and PC-based control, Beckhoff's new XFC control solution (eXtreme Fast Control Technology) breaks through previous control limitations with a cycle time of 50 µs, even in the software PLC. As a result, Bruderer can implement the cam group directly in the PLC. The convenient IEC 61131 development tools of the TwinCAT automation software ensure short development times and offer excellent diagnostic functions so that the Bruderer cam group can be extended flexibly.

→ Bruderer AG www.bruderer-presses.com

→ Beckhoff Switzerland www.beckhoff.ch