



Bruderer has been supplying stamping presses since 1999 (shown here: BSTA 510) with PC-based control technology and a custom Control Panel (right) from Beckhoff.

Interview with Herbert Högger from Bruderer on 20 years of close collaboration with Beckhoff Switzerland

Shared success through advances in technology and intensive exchange of expertise

Continual development and countless innovations have always been distinctive features of PC-based control technology from Beckhoff. In an interview with Herbert Högger, Head of Control Technology at Bruderer AG in Frasnacht, Switzerland, on the occasion of the 20th anniversary of Beckhoff Switzerland, one of the subsidiary's first customers described the collaborative partnership as well as technological benefits of PC-based control.



Herbert Högger, Head of Control Technology at Bruderer: “The Beckhoff PC-based control technology allows all current technologies to be implemented with ease due to its openness to the IT world. This offers significant advantages, for example in relation to implementing horizontal and vertical communication within a production facility.”

And when did you decide to fulfill these strict requirements using PC-based control?

Herbert Högger: We originally used a PLC integrated in a CNC in our machines, but the product was discontinued in 1996. We did not want to change over to a traditional PLC owing to the relatively high costs and the conventional control programming using an instruction list. It was at a trade fair where we had our first dealings with PC-based control, which could also be programmed with Visual Basic or Structured Text, and offered significant advantages – especially for developing a visualization. Since the hardware underlying this system came from Beckhoff, we ultimately came in contact with this automation technology provider in Germany.

Beckhoff Switzerland did not yet exist at that time.

Herbert Högger: That's true. But even back then, the two company philosophies were very well matched with the result that the contract for the “Bruderer control” project was inked as far back as May 1997. In principle, this contract still applies today, which in itself is a sign of the longstanding, trusted, and close collaboration that we built up. There are two important factors at play here: the continuity with contacts who still work at Beckhoff today and the family-like customer/supplier relationship that remains unchanged despite the subsequent business growth.

How important is direct contact and support for you?

Herbert Högger: It is very important to us to have intensive contact as well as fast and uncomplicated support when needed. This has worked exceptionally well from the outset with Beckhoff, especially with Beckhoff Switzerland – in

Bruderer specializes in stamping presses and feeder units. What special requirements are there with regards to usage in the field?

Herbert Högger: Our machines are used primarily in the mass production of stamping products. You will find Bruderer machines wherever highest availability and precision are called for in high and low stroke speed ranges – among automotive suppliers, in the production of connectors for the electronic, electrical, and computer industry as well as in the production of parts for clock mechanisms or metal packagings for the foodstuffs industry, to name just a few examples. A critical requirement in this respect is to ensure consistently high product quality with the highest possible product output. On one hand, this demands a high level of mechanical precision and, on the other, high-performance control technology. This is the only way to achieve a stroke rate of up to 2,300 per minute. Since applications in the industry frequently produce multiple-falling stamped parts, this can often result in an output performance of several thousand parts per minute.



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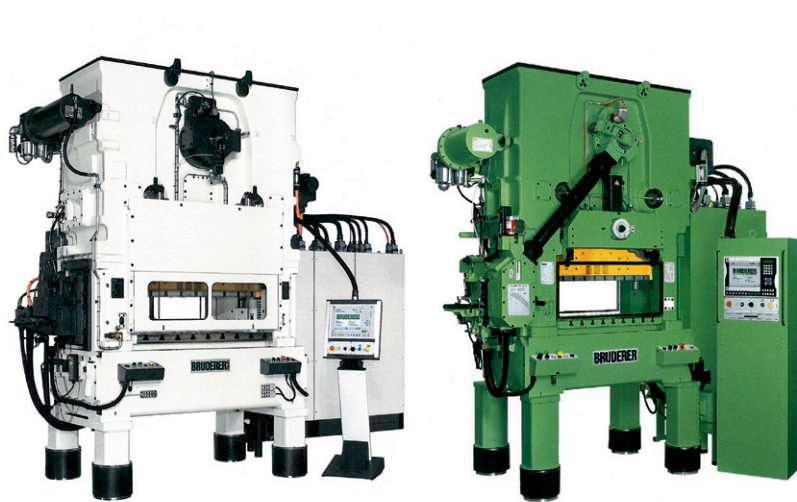
Schaffhausen as well as in the Arbon branch office. And this is the case at a professional and personal level, both with the Swiss experts and for more specialized requests with the product developers in Germany. When challenges arise, as can frequently happen over the course of machine development, we never feel that we are left to our own devices by the Beckhoff experts. The same is true when it comes to implementing specific requirements. Apart from the already very broad portfolio, we have never needed much persuasion to get Beckhoff started on developing or adapting a product. Especially considering such products, which may frequently be suitable for other purposes than ours, Beckhoff benefits from our industry and machine expertise too.

How did the technical collaboration pan out initially?

Herbert Högger: The area of stamping technology was still quite new for Beckhoff at that time, with the result that both partners were able to learn from each other. We initially drew up a specification, which defined the technology functions required for stamping presses, for example tool protection and press force monitoring, and naturally also the machine control system. Beckhoff passed this initial litmus test with flying colors – quite the technical challenge considering the 2,000 stroke movements per minute broken down in each case into 360 angular degrees. The first prototype of the new control system was successfully completed in 1998, with the first machine being shipped as early as April 1999.

To what extent has this new machine been field-proven?

Herbert Högger: The stamping system proved highly successful with a manufacturer of keyboards, and continues to do so to the present day. This is evident from the fact that it is still in use, which is certainly more than a testament to the quality both of the machine and the control technology. Moreover, it is proof of the robustness and long-term availability of Beckhoff control technology. Apart from an interim software update, the machine is still operating in its original state. Even if the Industrial PC used were ever to fail, we could replace it effortlessly today with an IPC that is compatible mechanically, that is, regarding interfaces. We would also benefit from enhanced computing power as a result



A recent stamping machine in the BSTA series (BSTA 810, left) and the first BSTA 500 stamping machine supplied with a Beckhoff control system in 1999 (right)

of technical advances. Particularly from our perspective as a manufacturer of machines with an extremely long service life, this is what makes Beckhoff stand out as a control system supplier. It is no coincidence that in the past 20 years we have been able to supply several thousands of systems equipped with Beckhoff controllers.

What are the fundamental advantages of PC-based control?

Herbert Högger: PC-based control is much more than just an easy-to-understand and clearly structured machine control system. As a central and intelligent control center, it serves the entire production cell and can communicate with a wide range of networks. This is especially significant since a modern machine control platform is also used for communication with other machines, as an interface connecting to other ERP systems, as a data repository for diagnostics purposes and tool management, and as a basis for data analysis and cloud connectivity as well as future AI applications. In contrast to a conventional CNC or PLC control system, PC-based control can be expanded and updated effortlessly by means of version management and software updates. Continuity is likewise assured in this way. We can still support the first machines and offer replacement parts if needed.

How important is the technical enhancement and innovative strength of a control technology to you?

Herbert Högger: This is just as important as consistency and compatibility. Our customers on one hand want to be able to use the same software in the long term with the simplest possible update options. On the other hand, however, it should be possible to leverage technical innovations, such as integration of measurement technology or Industrie 4.0 concepts. What is important here is that all possibilities are available; but that a technological advance is also implemented at the right time, consistently. For example, we are currently examining the merit of switching from TwinCAT 2 to TwinCAT 3 software. Our primary focus in this respect is on delivering optimum benefit for customers, in other words any reprogramming must incorporate all of our existing intellectual property and

adapt the software conceptually so that the advantages of TwinCAT 3 can be exploited fully. Examples in this regard include object-oriented programming, multi-core CPU support and cloud technologies.

How important is the openness of PC-based control to you?

Herbert Högger: PC-based control technology allows all current technologies to be implemented with ease due to its openness to the IT world. This offers significant advantages, for example in relation to implementing horizontal and vertical communication within a production facility. Furthermore, PC-based control is open with respect to the bus communication used so that other fieldbuses in addition to EtherCAT can be integrated in the system without the need for complicated changes to the control program.

Does the successful collaboration also extend beyond the product portfolio?

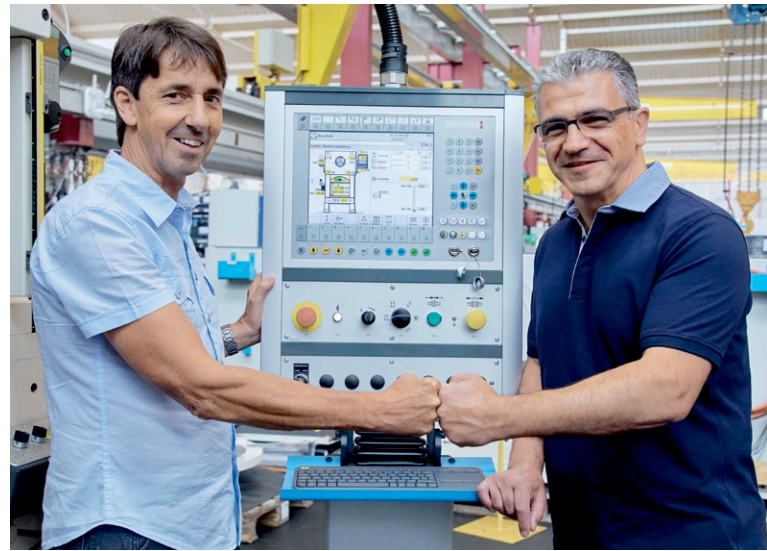
Herbert Högger: Yes, and even 20 years ago that was one of the fascinating questions for us in terms of collaboration with a technology partner. Ultimately, we are supplying an industry that is long-standing in nature, with machines that are in use for 30 years and more. In fact, even 50 years are feasible in this respect, assuming the mechanics and wiring are properly inspected and maintained over the years. From this point of view, we benefit enormously from the Beckhoff philosophy with products that offer long-term availability and with deep-rooted technological expertise through to motherboard production. Both elements guarantee us that the same I/O terminal or the same IPC – or at least a compatible successor product – will still be available after 10 or 20 years. The same applies to software, in other words, even if new Windows operating systems or new interfaces are supported, we can continue to work with TwinCAT without changes.

To what extent has PC-based control contributed to the enhancement of your stamping presses?

Herbert Högger: When we equipped the first high-speed press with PC-based control technology from Beckhoff in 1999, the option to adjust the stroke height at runtime was an outstanding feature. Solely through the high-performance IPC technology, it is possible to adjust the ram motion, which is critical for the quality of stampings and bends, in the μm range even at more than 2,000 strokes per minute. This is the only way to counterbalance the resulting dynamic effects of high-speed presses with their high centrifugal forces. In addition to improved control performance, we benefited from the outset from the fact that this current technology can also be used effortlessly for existing stocks. The machine operator therefore gets the same modern functionality as part of a system retrofit, without having to change the user interface. In addition, with Beckhoff as the control system supplier, we can be certain of having an extremely flexible and open system available to us, which will enable the use of all technologies and developments that become established on the market.

Have you also benefited in this regard from the development of the EtherCAT industrial Ethernet system?

Herbert Högger: The EtherCAT system developed by Beckhoff is still the best fieldbus technology on the market for us. Accordingly, we have also been involved from the outset in the EtherCAT Technology Group (ETG). What is



Herbert Högger (left) from Bruderer and Daniele Di Bella (right), Head of the Arbon Office of Beckhoff Switzerland, are delighted with the close and successful collaboration.

important is the ultra-fast data communication, for example in the area of tool protection and press force monitoring, since several sensors have to be queried here as simultaneously as possible. We are currently working with cycle times of 50 μs , which would not be possible without fast EtherCAT communication. We will continue to benefit from this technological edge for many years to come. That's because it eliminates the need to decentralize intelligent devices in the system and to establish accordingly intricate communication between them. The control system remains efficient and transparent. In addition, a centralized architecture makes it much easier to integrate new, and even complex, functions such as envelope curve monitoring or machine vision into the standard control system.

In which areas do you foresee special development potential for the future?

Herbert Högger: We are involved especially with data analysis and evaluation as well as predictive maintenance as part of what we call future projects. Beckhoff is highly innovative in this area especially, for example with the TwinCAT Analytics and TwinCAT Machine Learning products which we regard as very exciting. System-integrated measurement technology is also significant. The high-precision EtherCAT measurement modules above all offer significant potential for achieving even higher processing precision. As a matter of fact, our machines are built so robustly that hardly any expansion occurs in the mechanics despite the high stamping forces. At the same time, however, we need to measure the expansion in order to precisely determine the force exerted. Only a weak measurement signal that is almost below the disturbance level is available for this purpose, but it can still be recorded very effectively with the measurement technology modules of the ELM series from Beckhoff.

The interview was conducted by Stefan Ziegler, Editorial Management PR, Beckhoff Automation

More information:

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