

Interview with Jürgen Welker of KOCH Pac-Systeme on the design requirements of special machines for the packaging industry

Modular control technology for compact packaging lines, including in cleanrooms

KOCH Pac-Systeme, based in Pfalzgrafenweiler, Germany, specializes in customer-specific blister packaging machines and plants. A prerequisite for the flexible and efficient implementation of specific application requirements is a consistently modular machine design that is ideally supported by the finely scalable and open control and drive technology from Beckhoff. Jürgen Welker, Head of the Automation and Service Division at KOCH, explains where the specific advantages of PC control help, in particular in the demanding field of medical technology.



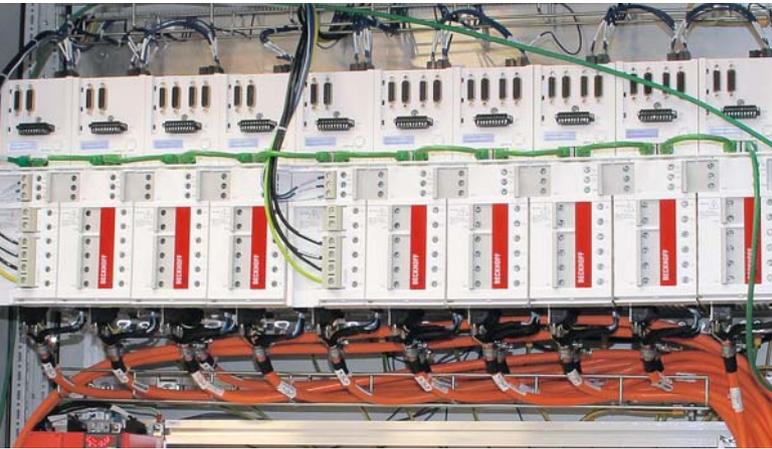
Jürgen Welker, Head of the Automation and Service Division at KOCH, in front of the new KDT medplus rotary table machine, which is conceived for cleanroom use in medical fields.

Which markets are most important for KOCH Pac-Systeme and what distinguishes your portfolio of solutions?

Jürgen Welker: KOCH offers packaging solutions for the most diverse industries, in particular for hard blister packs. We are clearly specialized in the design of special machines, that is to say, customer-specific machines and plants. It is precisely this flexibility and individuality that makes our products stand out as unique. We distinguish between three target markets – consumer goods, cosmetics/hygiene and medical technology, in which cleanroom requirements play a major part. In addition to that, KOCH considers not just the packaging machine itself, but also the entire process. Functionally, this ranges from the blister design and quality assurance to tracking and tracing, and on the plant side from the deep-drawing station, depalletizing robot, pick & place handling and sealing, up to the grouping of individual blisters and their final packaging.

How important is modularized machine design for custom packaging solutions and to what extent does Beckhoff control technology support you in that?

Jürgen Welker: A consistently modularized machine design is the prerequisite for packaging solutions that are tailored to precise customer specifications, but are nevertheless inexpensive. For example, our rotary table machine with sealing station can be extended by cover foil feeding, a back and front card inserter or automatic product feeding, depending on requirements. On the control side this is optimally supported by Beckhoff technology. We benefit here from efficient and flexible EtherCAT communication in conjunction with the wide range of digital and analog EtherCAT Terminals. Although the controller itself is still implemented using a central Beckhoff Industrial PC in order to minimize hardware costs as well as software and commissioning efforts, it would be equally simple to modularize with Beckhoff Embedded PCs.



The AX5000 EtherCAT servo drives are connected to the AM8000 servomotors via the OCT (One Cable Technology) solution, which saves around 40 % of the installation time.

How long have you been using PC control as the control platform?

Jürgen Welker: KOCH has been using PC control since 1996, and including servo drive technology since 2011. One of the main reasons for this is that back then we had to implement our machine controllers with the most diverse PLC systems according to the customers' wishes. With the very flexible Beckhoff technology, which is fully open for the world of automation, we could finally replace the wide range of PLCs that had to be supported up to then. In addition, the openness of the PC provided simple connections to higher-level systems. Considering the flexibility of TwinCAT PC-based control software, no traditional PLC programming tools could compete in any way. We still benefit greatly from the system openness, even today. An example of this is the established communication standard EtherCAT, which enables connectivity with all required components up to printers and scanners.

Your machines are flexible and yet simple to commission. What parts do PC control and TwinCAT play in this?

Jürgen Welker: For the machine manufacturer a huge advantage of Beckhoff automation technology, and especially of TwinCAT, is the very flexible system. For the controls programmer, of course, the software is still very structured in its organization. Another benefit is the simple communication with ERP systems, for example, via the SAP interface implemented by the TwinCAT OPC Server. This is especially useful for end users. We use TwinCAT NC PTP in our plants, plus TwinCAT NC I for the delta kinematics functionality which is automated using Beckhoff drive and control technology. We benefit here once again from the system openness, because many functions such as the heating PID controllers can be implemented using preconfigured TwinCAT libraries. If necessary, however, we can also integrate our own expertise - for example, our delta kinematics.

What unique advantages does the PC control hardware offer from your point of view?

Jürgen Welker: One very important item for our compact machines is the OCT (One Cable Technology) solution, which offers not only reduced installation



The I/O data points are acquired for the most part via EtherCAT Box Modules with IP 67 protection for a space-saving and flexible architecture as well as for a minimization in the number of switchboxes.

effort but also the advantages of the electronic name plate and the integrated absolute encoder. The main advantage is in the commissioning, however, due to the extreme reduction in the frequency of cabling errors. Specifically, OCT saves us around 40 % of the installation time and approximately 25 % of the costs. Another big advantage with regard to the flexibility and compactness of our plants is offered by the Beckhoff I/O system with its EtherCAT Box Modules in IP 67 protection. These I/O modules now acquire well over half the data points in the plants and they do so extremely efficiently, directly on the spot in the process, without the need for bulky terminal boxes.

In the 'medplus' line, you offer packaging machines specially designed for the medical industry. How do these differ from the standard offerings?

Jürgen Welker: Our new 'medplus' brand primarily features machine design in GMP (Good Manufacturing Practice), the cleanroom-compatible machine design, the calibration of relevant process parameters and machine construction according to GEP standards (Good Engineering Practice). The latter means, among other things, ease of cleaning, avoidance of hollow spaces, special lubricants, closed cable ducts and medically-compatible materials as well as qualification and validation documents compliant with GMP, GAMP 5 and ISO. In addition, the individual projects are attended to by a team of specialists. The result of all this is not only that a product is packed without errors, but also that the product quality is perfect and that the product reliably matches the respective packaging. At the end of the day it would be fatal if, for example, the plant were to swap a medication for raising blood pressure with one to lower it, or if a replacement knee joint of the wrong size were packed.

What do the requirements of medical and cleanroom technology mean for the automation technology?

Jürgen Welker: The special requirements for the automation technology are defined in the GAMP guidelines (Good Automated Manufacturing Practice). For example, how does a program have to look or how is a program modification recorded? Accordingly, a considerably greater number of monitoring mechanisms have been implemented in the 'medplus' version than in the standard



The KOCH delta robot also benefits from the high dynamics of the AM8000 servomotors.

versions. For instance, the printing on each package is inspected again afterwards to ensure that the product and the packaging information correspond. The 'medplus' know-how, thus has less to do with machine design and more to do with automation technology. Apart from these guidelines, the machine footprint is always an important issue in medical technology, because the plants are operated in expensive cleanrooms with limited space. For us as machine manufacturers this means that extremely compact systems are required, which we can achieve in large part due to the Beckhoff technology. As already mentioned, the EtherCAT Box Modules help, but so do the space-saving servo drives. We benefit in particular from the compact EL72xx servomotor terminals, which create enormous space savings.

For which applications did you conceive the KDT medplus rotary table machine presented at the Interpack 2014?

Jürgen Welker: The KDT medplus rotary table machine was specially designed for medical applications with a low throughput, say around five to ten products per minute. The packaging of knee and hip joints is a typical example of this. It is a semi-automatic machine in which the products are placed into the blister packs by hand. Of course, automatic product feeding can also be added if necessary and entirely in keeping with the modular machine design philosophy. An advantage for the end customer is that the KDT medplus makes do with only four tools, which keeps investment costs low and ensures short changeover times when switching products. The machine is automated via two NC servo

axes – AX5000 EtherCAT servo drives and AM8000 servomotors for the rotary table and the cover foil feeding – as well as around 80 I/O data points. The KDT medplus is thus a small system in comparison with our large machines, such as the current KOCH packagingLine for batteries with about 60 servo drives and 3,000 I/O data points.

Where do you see further optimization potential through PC control in future projects?

Jürgen Welker: In one of our current projects we are already using TwinSAFE as an integrated safety solution. We plan to implement this as standard in the future, because in the case of small systems with around 10 protective doors and large systems with up to 60 protective doors, an immense optimization potential arises in comparison to the previously used conventional safety technology. In order to investigate a switch to TwinCAT 3 we have successfully ported existing TwinCAT 2 projects with no great effort. We are expecting TwinCAT 3 to give us significant advantages in the modularization of our machines, in particular, through object-oriented programming.

Further Information:

www.koch-pac-systeme.com