



The multifunctional GMS 500 portioning system, which is a central component of modular TVI meat processing centers, is operated via a customized CP6901 Control Panel from Beckhoff.

PC-based control and servo drives form the basis for highly accurate weight-based meat portioning

Precise meat portioning requires short cycle times

TVI Entwicklung und Produktion GmbH in Irschenberg, Germany, specializes in machines and complete production lines for meat portioning applications. Fast processing, highly accurate weight-based portioning, and a high degree of flexibility are all industry requirements successfully met by the company for a decade. With the help of PC- and EtherCAT-based drive and control technology from Beckhoff, TVI plans to continue rolling out many new innovative developments for the industry.

Part of the basis for the company's success, says TVI, is the high performance of PC- and EtherCAT-based control technology. These solutions helped elevate the company as the market leader for red-meat portioning machines and lines. "In light of ever-changing market demands, our traditional technology had reached its limits. The PLCs we used at the time offered cycle times of up to 20 milliseconds. A linear servo axis can only move 10 millimeters in this time span. That's no longer sufficient for today's positioning and portioning requirements," explains Thomas Völkl, Managing Partner at TVI. "To ensure success today, PC-based control technology from Beckhoff is exactly what we need, because in our case it operates with a cycle time of 1 millisecond and easily enables synchronous control of seven axes." PC-based control also helped TVI combine energy-efficient and accurately controlled servo axes with fast single pneumatic valves to replace conventional pneumatic and hydraulic actuators.

TVI decided to replace conventional PLC technology with PC-based control back in 2008. The company started with one machine, the GMS 500, but others quickly followed. Today, TVI uses PC-based controllers exclusively. "We place our trust in Beckhoff, because we have already experienced the high level of innovation provided by the company. We highly value the direct line of communication and

rapid response times we get from Beckhoff, especially when we need service," adds Thomas Völkl.

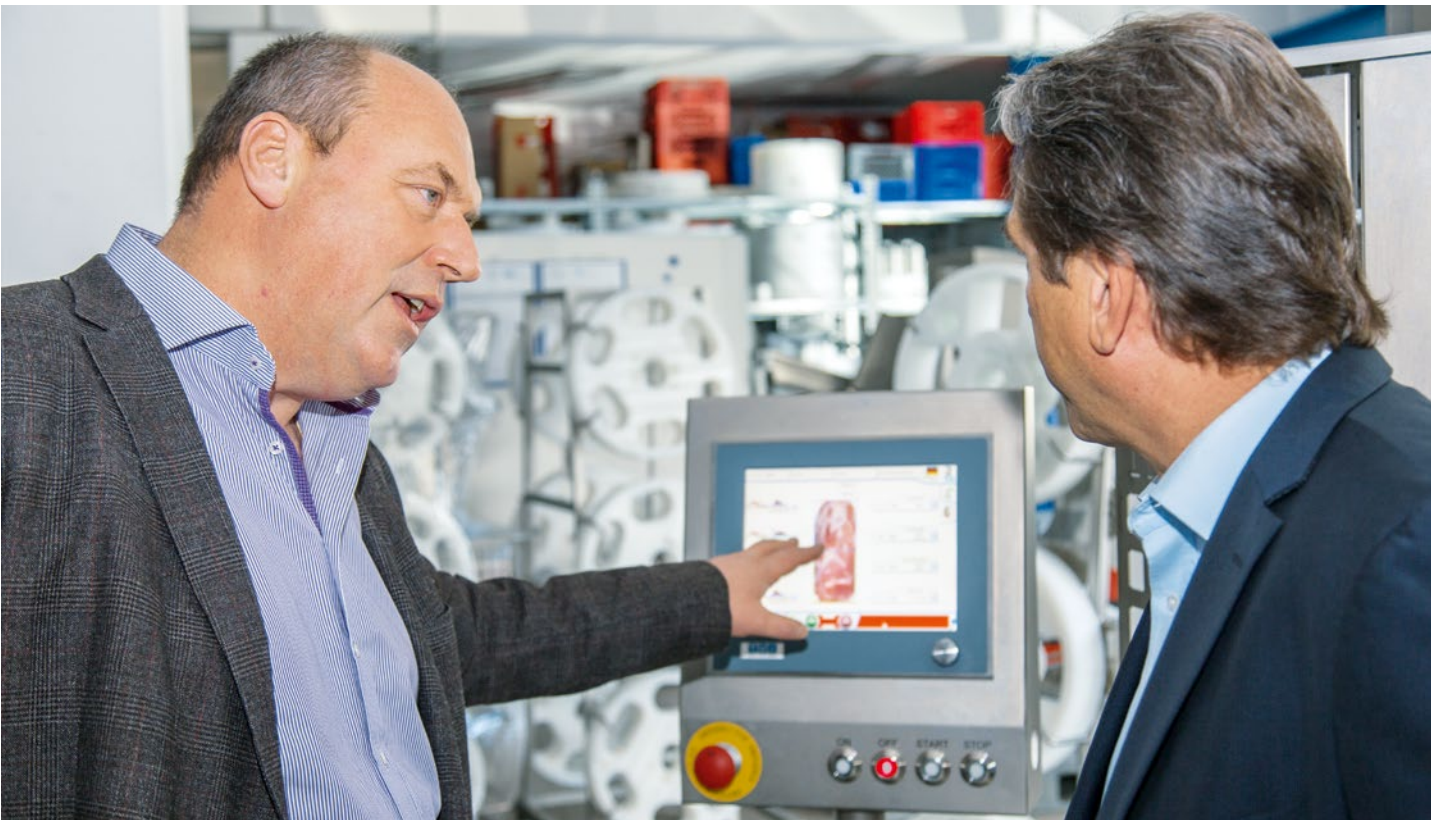
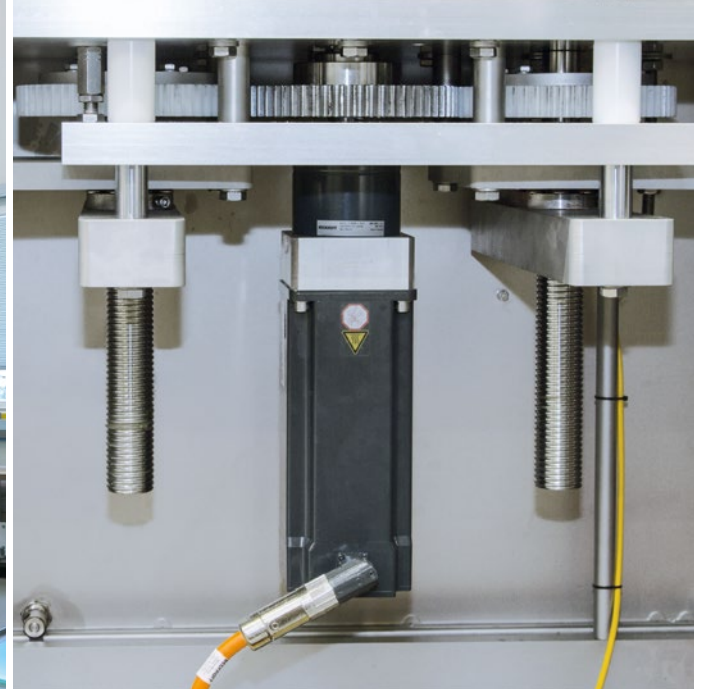
Reliability, speed and precision are all essential requirements

Meat portioning machines must be super-fast and super-accurate while maintaining total cleanliness. Because meat spoils quickly, the window of time for processing is very small. Large meat processing plants in Germany produce fresh red meat classics like cutlets, schnitzel, minute steaks, goulash and roulades every day. Since these foods only stay fresh for about a week, speed is always of the essence.

When retailers run special promotions, the entire processing and logistics chain faces even tougher challenges. Thomas Völkl explains: "Fixed-weight packages make it easier for discounters to run specials and change the price at the register with the push of a button. Offers like 'buy two, get one free' pull many customers into the store and increase all product sales, not just for meat. For example, if a major discount chain places its order by 5 p.m., the goods must be delivered to all German distribution centers by 6 a.m. the next morning. That is why all major meat processors aim to serve 80 percent of the demand

Currently with 86 employees, TVI develops and manufactures roughly 180 machines and systems annually in its Irschenberg, Germany plant, all of which feature PC- and EtherCAT-based control and automation technology from Beckhoff.

The AIR 520 automatic tray filler from TVI minimizes cabling costs using Beckhoff servo motors that feature One Cable Technology (OCT).



Managing Partner, Thomas Völkl explains future meat portioning requirements to Stefan Lorenz, Beckhoff head of sales for southern Bavaria in Germany.

during the day shift, taking weather, upcoming holidays and other factors into account. The remaining 20 percent is produced by the night shift. Logistics like these require maximum equipment availability, reliability and flexibility, paired with quick changeover times and ease of operation and cleaning.”

Above all, the portioning machines must be able to accurately weigh and cut the meat, preferably without creating any excess or waste. With the GMS 500 portioning machine, meat that has been cooled or warmed to a specific temperature is placed into tubes, where it is pressed into shape and measured. Next, a rotary knife cuts the meat into slices with the thickness determined by a linear axis. Control and servo drive technology from Beckhoff ensures that the process is executed with the utmost speed and precision. A single cut takes between 250 and 500 milliseconds, which means that the machine can produce up to 14,000 meat slices per hour. The GMS 500 portioning system operates with seven servo axes powered by four AX5206 servo drives, and AM3021 servo motors with AG2210 planetary gear units. The machine is controlled by a CX1030 Embedded PC running TwinCAT 2 NC software. The Control Panel is an integrated CP6901 with a stainless-steel bezel and a flush-mounted 12-inch touchscreen.

PC-based automation everywhere

A complete TVI meat processing system comprises tempering (including shock-freezing), cutting, portioning and fanning, placing in trays, final control with discharge and rework, and transfer upstream to packaging machines. The individual machines can be combined to form complete processing lines. A major reason for the consistency of the solutions from TVI is the broad product portfolio offered by Beckhoff, which ranges from AM3021 servo motors, AX5000 Servo Drives and EL72xx servo terminals to EtherCAT I/Os and Embedded PCs from the CX20xx and CX51xx series, coupled with TwinCAT 3 software and 12-inch touchscreen displays in stainless-steel. “We employ these components in all our new equipment designs because they meet our needs in terms of performance, hygienic requirements and ease of installation. We have also implemented TwinSAFE in some of our machine series, and the AM8000 servo motors with One Cable Technology (OCT) are used in our AIR 520 tray fillers,” says Thomas Völkl.

Business relationship with a great future

“We began working with Beckhoff eight years ago based on the consistent, modular design of the company’s control and drive technology. We continue to support this partnership wholeheartedly because we are happy customers,” summarizes Thomas Völkl. “Since we are highly innovative ourselves, we need an innovation-oriented partner like Beckhoff that acts in concert with us. As today’s machine developments focus heavily on flexibility, I want to see as many pre-finished templates and software modules as possible. This enables us to focus on what we do best as machine manufacturers.”

Völkl adds: “For some time now, TVI has cooperated more closely with MULTIVAC Sepp Hagggenmüller SE & CO. KG to offer complete lines which handle entire processes, from provisioning of meat all the way to arranging the finished product and filling pallets. As part of this relationship, TVI will make use of MULTIVAC’s strong sales and service network in order to make inroads into new markets. Since both companies decided years ago to use Beckhoff controls technology, sharing our respective hardware and software expertise will be easy. As part of our first joint project, four gantry robots with four axes each place approximately 1,600 kilograms of pork chops per hour into thermo-molded trays. The hardware and software, which were originally developed for delta-3 kinematics, was adapted to the gantry robots’ X/Y/Z/C travel axes. Since the shared hardware and software foundation made the process relatively easy, development of the project didn’t take long. As a result, MULTIVAC and TVI can focus even more effectively on customer-specific needs in the future. At the end of the day, our partnership has been extraordinarily successful.”

Another challenge TVI wants to face in cooperation with Beckhoff is the integration of safety technology. To meet safety requirements, TVI will implement TwinSAFE in all future machines. Thomas Völkl: “We will also work even more closely with Beckhoff to leverage other innovative automation technologies like TwinCAT 3, OCT and multi-touch panels in our new developments.”

Further information:

www.tvi-gmbh.de/en