



PC-based shrink film packaging machine for PET and glass bottles

High-precision film cutting control with TwinCAT

Chinese machine builder, Yinghui Packaging Mechanical Equipment, based in Foshan in Guangdong province, specializes in industrial equipment for packaging applications such as fully automatic shrink film wrappers, carton strappers, palletizers, carton loading and unloading systems and labelers. Yinghui uses integrated PC-based control technology from Beckhoff in order to meet the requirements of the international ISO9001 quality standard for its machines.

Clients of high-quality Yinghui packaging machines for beverage, food and chemical products include large Chinese companies such as the Yanjing and Tsingtao breweries and the Hainan Coconut Palm Group.

Shrink film packaging machine bundles bottles

The P series shrink film packaging machine is one of Yinghui's big sellers: The machine separates bottles and wraps them horizontally. Changeovers are quick and easy, and the machine is therefore suitable for processing a wide range of bottle types. A special film feeding and cutting machine ensures exact film lengths. The biaxial protector device facilitates film changes. To ensure a visually attractive finish, uniform film shrinking takes place in a carton feeding channel with a hot air device.

The control platform for the machinery consists of: a CX1010 Embedded PC, AX5000 series EtherCAT Servo Drives, AM8000 servomotors with One Cable Technology (OCT) and TwinCAT PTP automation software.

Precise I/Os in conjunction with high-performance sensors ensure perfect film cutting

High-performance sensors are used at critical points in shrink wrapping machines where the position of objects must be picked up quickly and precisely. For example, the film feed unit for the Yinghui shrink film packaging machine for 60 units reaches a speed of more than 2 m/s. This means that the film markings must be sampled at high speeds in order to ensure precise cuts.

The respective axis position is logged in real-time via the measuring probe functions of the AX5000 EtherCAT Servo Drives and is stored with a timestamp. In the drives, a relevant event may be the edge of an input signal for an optical high-speed switch, for example. The drives store the data for this position immediately, independent of the PLC cycle time. Activation of the measuring probe function requires configuration of the relevant parameters in the drives. To this end the measuring probe is linked with the function block MC_TouchProbe in TwinCAT and managed via this function. It determines when the measuring

Yinghui Packaging uses Beckhoff AM8000 servomotors. In conjunction with the camming function in TwinCAT automation software, the servomotors ensure jerk-free movement of the bottles.



The shrink film packaging system is operated via a built-in "Economy"-type Control Panel.



AX5000 series EtherCAT Servo Drives are used for exact positioning of the motors. The axis positions are sampled in real-time via the measuring probe functions of the AX5000 Servo Drives.

probe function is activated, or whether the trigger window must be set or not. The position of the film marker is precisely sampled by the measuring probe function. If a deviation is detected, the alignment is rectified in advance. The cut deviation is then adjusted in real-time, based on the online edit function of the NC CAM table. This ensures that the markings of all films are identical.

Jerk-free motion during bottle separation via TwinCAT Camming

The electronic gearing ensures appropriate transformation of the slave axis speed relative to the master axis. The cam plate is used to determine the relationship between slave and master axis positions. The TwinCAT motion control package offers a variety of motion functions, which can be edited and configured with the TwinCAT CAM Design Editor. The TwinCAT NC Camming library is used to execute the motion functions and modify them online. In this way, it is possible to not only specify the position of a slave axis relative to a master axis, but also the motion function between two adjacent points, so that sections for "smooth speed" or "smooth acceleration" can be defined.

High-precision bottle separation, which is the key and most difficult part of the whole machine, takes place via the TwinCAT cam plate function and is jerk-free thanks to the flexible cam plate algorithm. A beneficial side effect is enhanced service life of the motors. If different clamping jaws are used, the bottle separation system can offer different offsets via online modification of the cam plate function. Therefore, it is possible to correct deviations relating to the mechanical configuration in order to make bottle separation more stable and precise. The system (with offset function) can stabilize the process significantly, particularly for smaller or squared bottles. If the motors for bottle separation and the spindle motor are coupled, the speed of the bottle separation motor can be adjusted automatically to different operating speeds of the whole machine.

Further Information:

www.china-yh.net

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