

High-precision logging of laser markers with EtherCAT

Advanced PC-based Control upgrades foil stamping machine

Foil stamping is an important part of many printing processes and is used to accentuate packaging, greeting cards, magazine covers, labels, etc. Go-Well Electrical Technology Co. Ltd, based in Shanghai, China, has developed a fully automatic hologram foil stamping system that is controlled by a Beckhoff Embedded PC and EtherCAT Terminals, which is integrated seamlessly into a fully automatic punching and folding machine.



Automatic punching and hot foil stamping machine from Brasse with integrated hologram unit from Go-Well.



The fully automatic hologram foil stamping system integrates seamlessly into the punching and folding machine.

During hot foil stamping the coating, such as colored metallic foil, is separated from the applied foil through pressure and heat and is then pressed onto the paper or card. The process may involve simple foil stamping, hologram or laser foil stamping. From a control perspective, hologram foil stamping is the most demanding technique in this kind of application.

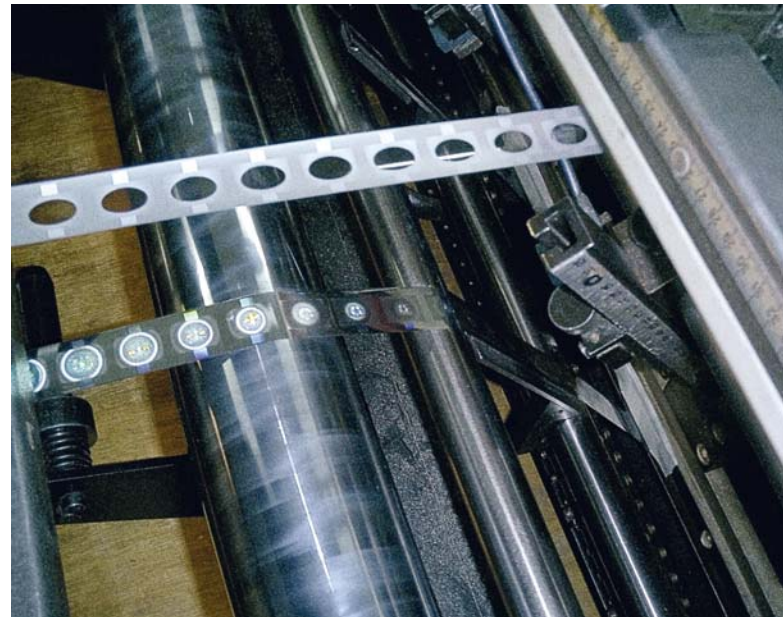
Feed rate adaptations done “on the fly”

At the core of the hologram foil stamping control solution from Go-Well is the EL5101 EtherCAT Terminal from Beckhoff. This incremental encoder interface terminal can quickly and exactly record the position of the laser marking on the aluminum foil, which is scanned by a light barrier with a linear speed of more than 2 meters per second. The position information is forwarded to the controller and used for precise control and online modification of the respective cam curve with the aid of the TwinCAT NC Camming software library from Beckhoff.

At the start of the feed process the cam controller moves the axes with a theoretically determined feed rate. After scanning the laser marking at the specified “window” position the feed rate is adjusted “on the fly” by calculating the difference between the actual and the theoretical laser marking position. The corrected data are processed based on certain statistical procedures, in order to detect and avoid incorrect sampling or excessive settings.

Integration of measurement technology reduces hardware costs

Common foil stamping control solutions regulate the temperature of the electrical heating plates via a separate temperature controller with a timer switch, which deals with 12 to 18 temperature zones. The costs for this system typically make up a significant part of the total control cabinet costs. However, instead of a special hardware solution, Go-Well uses space-saving Beckhoff temperature measuring terminals in its foil stamping machine, which integrate seamlessly into the control platform. “This leads to a significant reduction in the hardware



The position of the laser marking on the aluminum foil is logged quickly and exactly. It is then forwarded to the controller via the EtherCAT incremental encoder terminal.

costs and offers our customers a competitive solution,” said Lv Yi, Chief Engineer at Go-Well. In addition to the usual temperature control functions, the operating time-based preheating and heating functions were also automated, significantly reducing the time required for heating and cutting overall energy consumption as a result.

Precise control of raw material consumption

The high-performance of the CX1030 Embedded PC as a control platform enables Go-Well to utilize the full bandwidth of automatic calculation functions as well as managing a large number of recipes for the foil stamping process. “In addition, we also integrate a function for simulating the production process, thereby offering our end customers enhanced convenience,” said Lv Yi. Before the start of production the system is able to precisely calculate the required foil quantity. A warning system indicates when the foil material is running low, preventing machine stoppages. A dedicated program calculates the optimum foil consumption and the optimum foil utilization. As a positive result, the machine operator can therefore always manage and ultimately reduce raw material costs.

“The Beckhoff Embedded PC, with directly connected EtherCAT Terminals, has proven to be an ideal control platform for our foil stamping machine. Having demonstrated its reliability and stability over several years of operation, the machine is now manufactured in series production,” said Lv Yi. “Particularly in the development of the operator control elements we were able to let our imagination run free. The user interface combines perfect functionality with simple handling.”

Further Information:

www.beckhoff.com.cn