Daetwyler: New control concept for printing plate machines uses Beckhoff technology

Significant improvement in system performance

Customized Control Panel as graphical user interface with link to the high-level control system.

New control concepts aren't introduced every day and not without good reason. Accordingly, the new PC-based automation system introduced at MDC Max Daetwyler AG, the Swiss specialist manufacturer of printing plates for gravure and flexographic printing, has considerable strategic significance. As a result of the upgrade, machine performance has increased significantly and development, maintenance and staff training have been drastically simplified.

A production facility for printing plates consists of several machines – the actual laser engraver, grinding machines for the printing cylinder, galvanic baths for electroplating of new and used cylinders, crane systems for transporting the cylinders, mixing facilities for the galvanic baths, etc. MDC Max Daetwyler AG, based in the Swiss town of Bleienbach, was looking for a new control concept covering the complete range of its products, in order to open up the performance and full potential of their already proven machines.

The first machine to be upgraded was the "Laserstar" engraver, which features fully automatic, high-quality exposure of gravure cylinders and offers very high running precision with an engraving capacity of 140,000 cells per second, plus a significant improvement in printing quality. The concept is based on the Direct Laser System (DLS), which offers significant advantages in terms of reproducibility, quality and raw material consumption compared with electromechanical engraving (EMG).

With an engraving speed of up to 35,000, optionally up to 70,000 cells per second, six NC axes, approximately 200 I/Os and two 400 W lasers, the "Laserstar" engraver is very demanding when it comes to automation engineering.

The "control center" of the Laserstar engraving machine, equipped with Beckhoff components: C6240 Industrial PC for control tasks and C6250 for visualization, PROFIBUS Bus Couplers and Bus Terminals.

Decision in favor of technology shift

At the end of 2004, Daetwyler decided to implement a new control system. Peter Pfister, development manager and member of the Daetwyler management team, explained the principal motivation behind the project: "We have been using advanced controllers for some time, but in the past our systems had not been integrated. The new concept aims to set company-wide standards, with the main aim of simplifying development, training and maintenance." The decision to use Beckhoff technology was based on several aspects. "Company-wide and long-term strategies are behind such an important decision," Peter Pfister continued. "We, therefore scrutinized all main automation providers, both in terms of the technology and of the support offered because in addition to the actual technology, worldwide acceptance and support are of central importance for us. In the end, we had to decide between Beckhoff, another large provider from Germany, and one from the USA. Ultimately, the PC-based control technology from Beckhoff won the day."

Stefan Keller, member of the sales team of Beckhoff Switzerland, is justifiably proud of this market success: "The technological benefits of our system prevailed against a number of well-known and large competitors, not least because Beckhoff has subsidiaries worldwide, is able to respond capably and efficiently to enquiries, and provided the best support for Daetwyler's worldwide commitment." Peter Pfister added: "So far our experience with Beckhoff in terms of technical cooperation and service has been very good."

➔ **The Beckhoff control solution includes the following components:**

| Control cabinet Industrial PC (C62xx series)
| Control Panel as control unit
| Bus Terminals as I/O system
| TwinCAT NC PTP, PLC and Motion Control software

Control concept for the future

In the future, all control systems for MDC machines will be based on the same object-oriented architecture in order to enable identical procedures for the software development of all MDC product groups. MDC Max Daetwyler also aims to standardize the diagnostic tools (such as log files) and machine operation for all product groups. The three fundamental control architecture components are integrated into one system:

➔ **User interface/external input:**

| graphical user interface (operating terminal) with link to high-level control system (no direct coupling with the software PLC)
| programming language: Java, Phyton or others depending on the task at hand

➔ **High level (process control):**

| object-oriented development with UML tool
| programming language: Java or other machine-dependent process control, depending on the operating system
| low-level controllers (individual modules) controlled via single interface

➔ **Low level (hardware control):**

| software PLC programmed in ST code
| subdivision into modules according to the hardware. The modules should be independent of machine types so that they can be used in different product groups (machine types) with identical or similar hardware

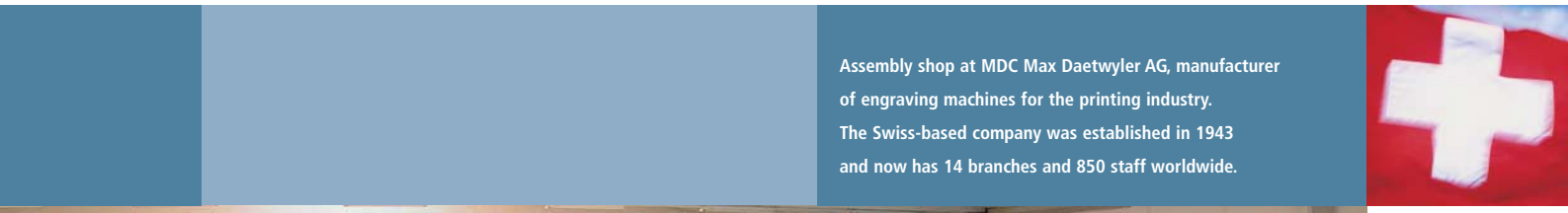
- connection of individual modules with the high-level control system via a generic interface
- fieldbus for digital and analog I/Os (preferably Ethernet, PROFIBUS DP or Interbus)
- components for axis control in more complex machines

High-performance automation is needed

So far, the new control concept has been implemented in two Laserstar engravers with six NC axes, approx. 200 I/Os and two 800 W laser heads, which require maximum precision when it comes to automation technology.

The NC axes and I/Os of the Laserstar engraver are controlled via TwinCAT software and an Industrial PC. An additional Industrial PC and a customized Beckhoff Control Panel are used for operation and visualization. Stefan Keller explains: "The consistency and ease of use of our system is demonstrated by the fact that the conversion of the machine control system to TwinCAT was completed very quickly – within six months." According to Peter Pfister, the system has already proven its performance capability: "In general, we are still in the set-up phase, although the first machines have already been delivered. The following performance data illustrate the demands on the control technology: The Laserstar blows 140,000 "holes" per second into a cylinder with a circumference of 2 m and a weight of 2.5 t at a peripheral speed of approximately 15 m/s. Constancy of the movement and alignment of the optical system in the mm range are a significant challenge. In the past it took approximately 15 minutes before engraving could commence. With the new control concept, it only takes 30 seconds. Naturally, this significantly increases machine performance."

→ MDC Max Daetwyler AG **www.daetwyler.com**
→ Beckhoff Switzerland **www.beckhoff.ch**



Assembly shop at MDC Max Daetwyler AG, manufacturer of engraving machines for the printing industry. The Swiss-based company was established in 1943 and now has 14 branches and 850 staff worldwide.