

Fully automated system for punching printing plates

In use

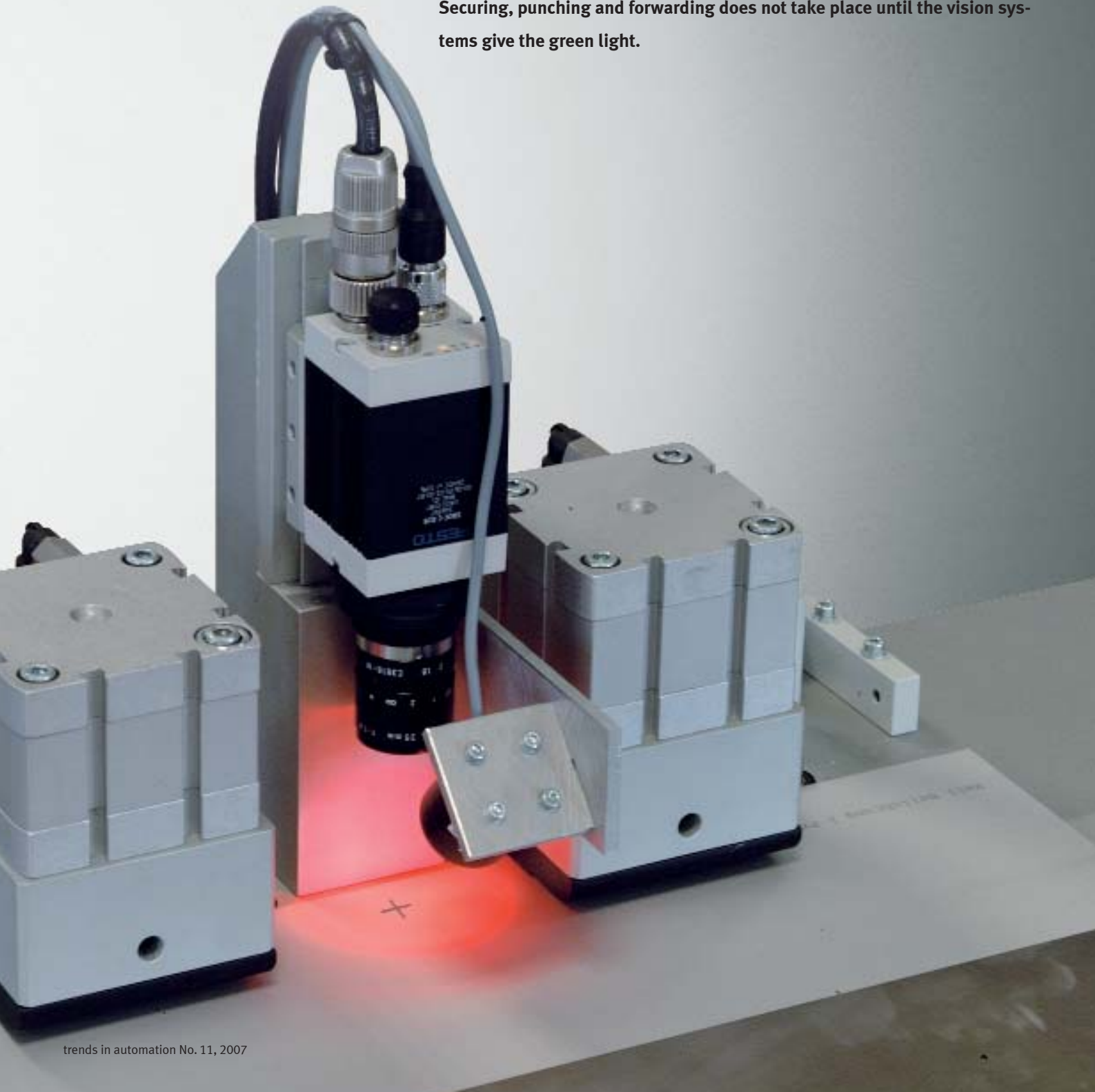
Ready-to-install handling system with linear motor axis DGE-LM and compact vision system SBOC-Q

Benefits

- Optical position sensing of the register marks
- Precision alignment of the printing plates on an X/Y-axis table

A perfect fit

Precision placement: In Beil's automatic plate punching press, linear axes move the printing plate until the register marks are accurately positioned. **Securing, punching and forwarding** does not take place until the vision systems give the green light.



■ In order for the colours to match and the printed images to be sharp, printing plates must lie exactly above one another. To ensure this precision right from the moment the plates are punched, Gunter Beil, owner of Beil Registriersysteme GmbH, decided to develop an automated punching system. Festo System Solutions were on board right from the planning phase through to implementation.

Time is money

Gunter Beil went on to say, “Since our core competence is in the area of precision mechanics, we would have had to employ people with the appropriate specialist skills to develop an automatic plate punching system. We didn’t want to lose any time as we wanted to present the machines just seven months later at the Ipex print and publishing exhibition. That’s why we decided to buy in the mechatronic components.”

The order was placed with Festo around seven months before the trade fair. “We liked the technical concept and we valued the worldwide availability of spare parts since 90% of our machines are used abroad”, explains managing director Stefan Kreitzick. “If we had needed to employ and train our own staff first, we wouldn’t have had enough time”, adds Armin Baier, technical director of the company. “By accessing the know-how of the system specialists at Festo, we were also able to take advantage of the experience of Festo’s automation experts for the PLC, user interface, axis controllers and linear axes.”

Focus on plates

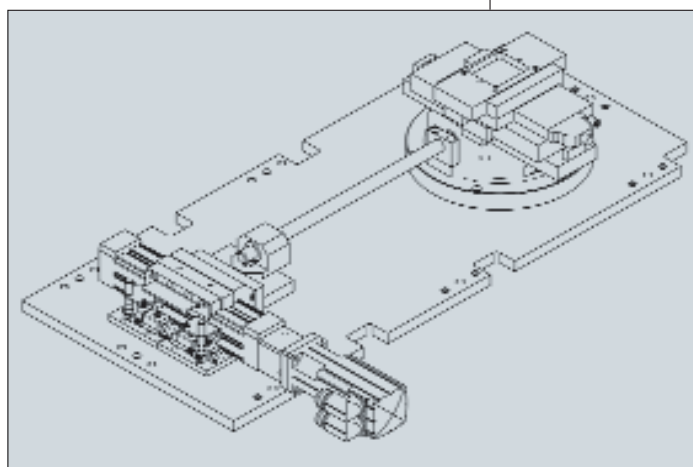
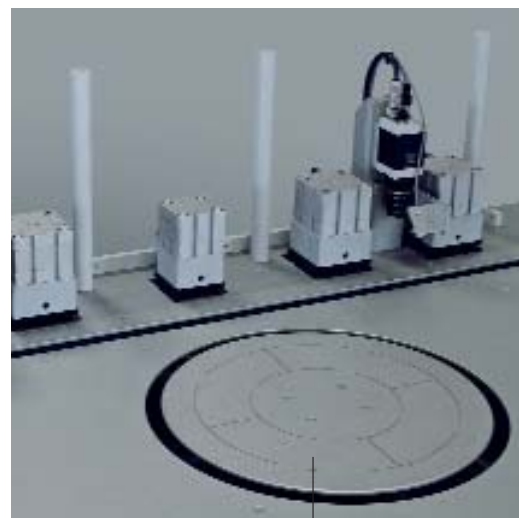
A vacuum rotary table projects above the centre of the plate table by just a few millimetres. Plate



Beil attracted great interest at the Ipex trade fair in Birmingham (UK). The reason? Its new punching system. This system precisely aligns the register marks of printing plates – with the help of two compact cameras SBOC-Q, an X/Y-axis table comprising new linear motor axes with air bearings and a spindle axis with servo motor from Festo.

after plate is either manually placed on this table following exposure or automatically supplied via a belt conveyor. Once the plate has been positioned at the so-called trigger stops, the two compact cameras SBOC-Q check the positioning marks on the plates: a mark for checking the X and Y position and a fine line for detecting rotation.

The cameras with a built-in electronic evaluation unit enable positional deviations to be quantified even at this level and the correction values to be forwarded to the Festo PLC PS1. It coordinates all measurement and drive-related components and also controls the two linear motor axes with air bearings DGE-LM via the axes controller (which together form an X/Y-axis table and support the rotary table). In the case of strokes of up to 30 mm along the X and Y axis, the two axes correct the position of the plate to 0.02 mm.



Schematic diagram of the new punching system developed by Beil: the punching specialists bought the entire mechatronic subsystem for the prototypes ready to install from Festo. For series production, Beil assembles the parts itself. Axes DGE-LM have no rotating parts and no friction, which means they also have no frictional wear.

The correction of the rotation angle is based on the result of the measurement by the second camera and results in the actuation of the spindle axis DGE-SP via the servo motor. In the case of strokes of up to 50 mm, it can rotate the rotary table via a lever of around 40 cm by up to ± 5 degrees with very high resolution.



A quick glance under the surface of the X/Y-axis table shows just how compact and flat the mechatronic subsystem is.

Before punching, the position of the plate is repeatedly checked until the two cameras indicate a perfect alignment. "The PLC does not forward the signal to the Festo valve terminal CPX/MPA until the reference mark is perfectly adhered to", explains Armin Baier. "First, it actuates two clamping cylinders initially, followed by a further five clamping cylinders." Following punching, rodless pneumatic drives DGC gently tip the

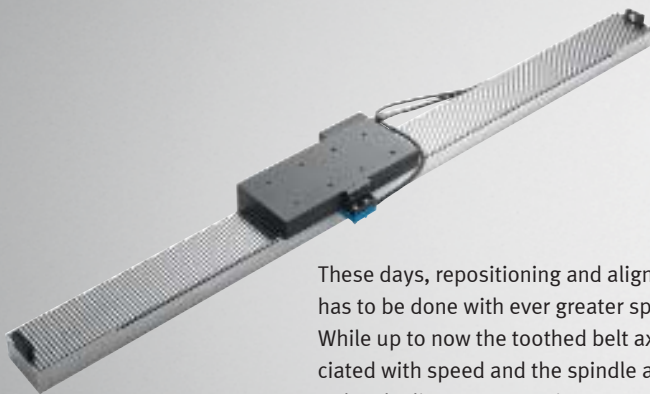
printing plates onto the plate stacker. A standard cylinder DNC aligns them and places them on the conveyor trolley.

Mechatronics from a single source

"Our decision to develop the mechatronic system as a ready-to-use unit together with Festo and also buy in the components for the prototypes has enabled us to benefit from the experience of the leader in automation technology",

says Günter Beil. "This was the only way we could keep the time-to-market short enough to be able to release the new system in time for Ipex." ■

Symbiosis of speed and precision: Linear motor axis DGE-LM



These days, repositioning and aligning of workpieces has to be done with ever greater speed and precision. While up to now the toothed belt axis has been associated with speed and the spindle axis for precision, today the linear motor axis DGE-LM combines both requirements:

- 3 sizes: 30, 64, 120
- Stroke lengths from 0 to 5000 mm
- Feed force from 30 to 500 N
- Speed 4 m/s
- Repetition accuracy 1 μ m
- Acceleration 90 m/s²

The other features are equally impressive:

Ultra-compact design

- No external guide
- Overall axis length = effective stroke + slide length

Maintenance-free operation

- Air bearing with no wearing parts, as a result no friction in the guide elements and no lubrication
- Insensitive to dirt
- No increase in temperature at high acceleration and speeds

Plug and work

- Integrated guide, displacement encoder and cable connections
- Precision mounting points via centring holes

Flexible control concept

- Decentralised: simple actuation using Festo servo axis controllers
- Centralised: Festo controller or customer PLC

is 1107

Compact vision system SBOC-Q



The valve terminal CPX/MPA is positioned directly below the plate punching table. It communicates with the higher-level drive controller via Profibus DP. In addition to actuating the punching cylinders pneumatically, the valve terminal also registers the sensors.

Compressed air preparation is performed by an MS series service unit. It supplies the pneumatic cylinders and the air bearing system of the linear motor axes DGE-LM.

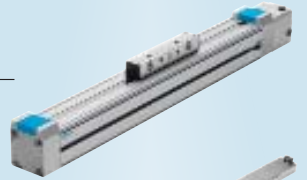


at Beil

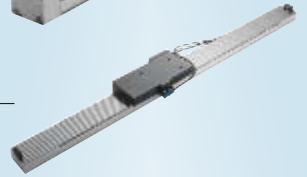
Compact cylinder
ADVU



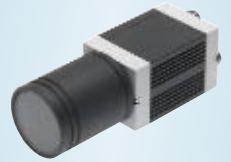
Spindle axis
DGE-SP



Linear motor axis
DGE-LM



Compact vision
system SBOC-Q



Display and control
unit FED-90



Electrical terminal
CPX with valve terminal
MPA



MS series
service unit



Products

Beil Registersysteme GmbH

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