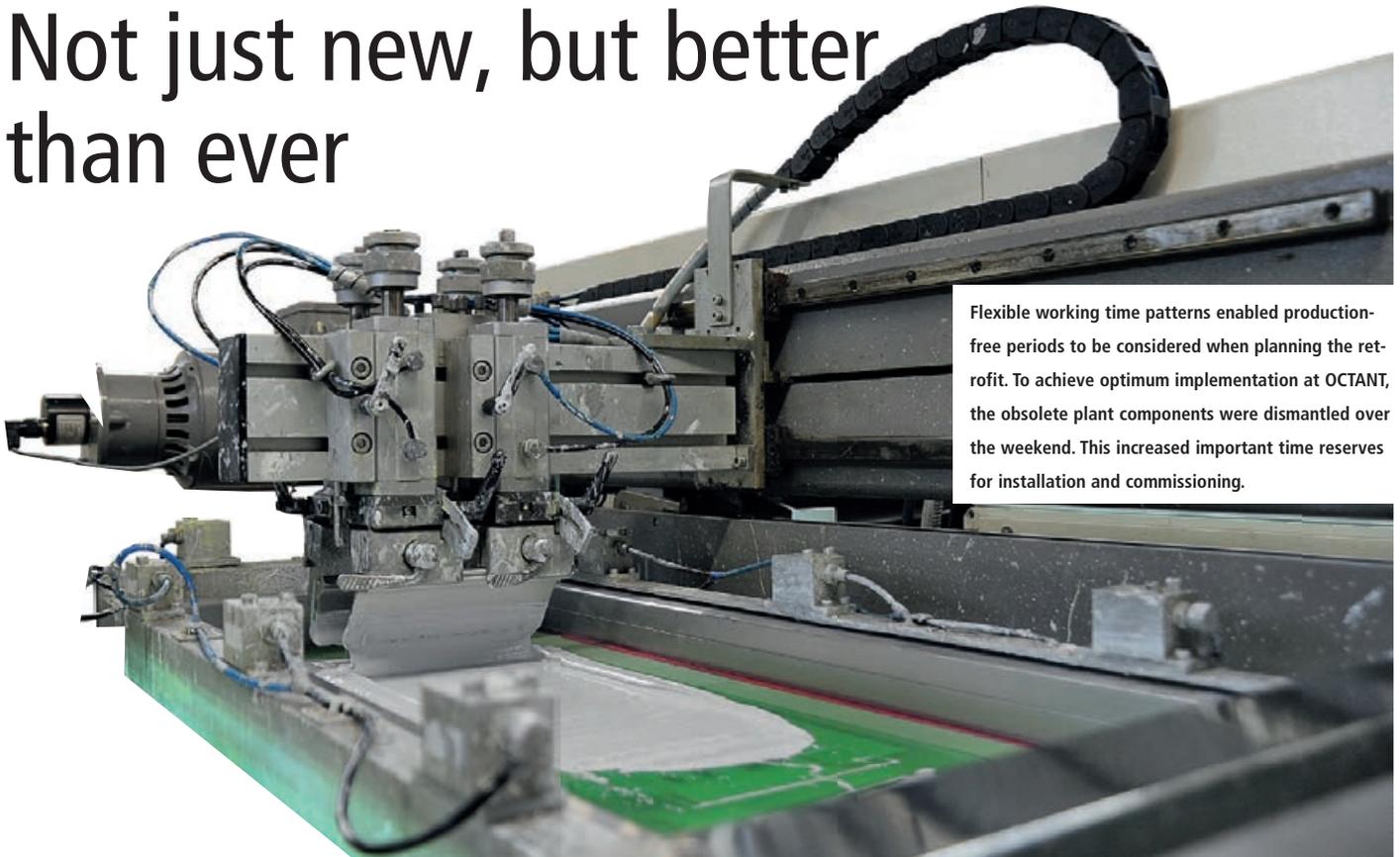


Customized plant retrofit with PC-based control technology

Not just new, but better than ever



Flexible working time patterns enabled production-free periods to be considered when planning the retrofit. To achieve optimum implementation at OCTANT, the obsolete plant components were dismantled over the weekend. This increased important time reserves for installation and commissioning.

In order to ensure the reliability of their screen printing line, OCTANT Siebdruck GmbH decided to initiate a retrofit. This had three advantages over a new installation: securing long term production at the company's Bielefeld, Germany site, protection of the company's own know-how and protecting the investments already made. The short amount of time available for the retrofit was among the challenges faced: An engineering team from Beckhoff had only three weeks to help OCTANT convert the PLC-controlled screen printing line, built in the age of parallel wiring, to modern, PC-based and EtherCAT-based control technology.

OCTANT Siebdruck GmbH, the family-run company based in Bielefeld, Germany, specializes in the UV-screen printing of plastic items. Printed panels for domestic devices are delivered "just-in-time" from a fully automatic screen printing line, directly to the customer's ongoing production: the quantity ordered is delivered at exactly the right time, sorted according to the assembly line and the manufacturing order.

Customer know-how secured

In spite of preventive maintenance, the reliability of the PLC-controlled screen printing line at OCTANT, installed in the 1990s, was continuing to fall. As controller spare parts were no longer available on the open market, the company decided to retrofit the plant control system, under one condition: The work had to be completed during the end-customers' three-week company holiday. As Stefanie Neuhaus, Managing Partner at OCTANT, explained, "We work in three shifts to print assemblies on the screen printing line. We deliver the assemblies about 36 hours in advance, directly to the end-customer's production facility."

OCTANT's Managing Director Wolfram Meyer added that, "The competitive pressure in our industry and the need to secure our own know-how both played a role in the decision between retrofitting and a new installation. The method we use is, we believe, unique to the whole world. We use UV flash drying in our compact plant, while our competitors use a long tunnel to dry the ink. This makes OCTANT much more flexible. We also benefit from very short reaction times whenever changes are made."

Skilled engineering team provides the assist

OCTANT looked for a partner for this retrofit who could handle everything from project planning through to production start-up, and decided in favor of the Applications Engineering Department at Beckhoff Germany. As an independent department employing about 150 staff, the team has profound expertise in this sector, and offers complete solutions for almost any application, from machine construction to wind turbines. This expert team can provide support to Beckhoff customer applications throughout every location. David Derksen, Project Coor-

dinator at the Beckhoff Engineering Team, describes the special challenge of this project: "This controller retrofit demanded particularly precise project planning and implementation if the specified time window of just three weeks was to be satisfied. The customized complete solutions from our in-house development gave us important time reserves before the start of production, and these were needed for the integration of third-party systems."

Centralized, real-time control combines all functions

Originally, the operating panels at each of the four printing stations constituted a self-contained control environment with dedicated I/O components. This proprietary signal transmission arrangement was modernized: The control cabinet for the screen printing line, with a C6920 Industrial PC (IPC) and TwinCAT NC PTP software, constitutes the central controller. A 15-inch CP6902 "Economy" Control Panel is fitted into the front for central, visual component tracking. The compact C6920 IPC needs only three RJ45 sockets in addition to the DVI connector to connect to the peripheral equipment: One for an EtherCAT line, one for a remote servicing interface via Ethernet, and one for a switch that distributes signals from the control computer to Ethernet operating panels on the printing units.

In each printing unit, an EK1100 EtherCAT Coupler acts as a decentralized I/O station, combining all the signals that were originally wired in parallel. Starting from the control cabinet, this EtherCAT line stretches out over the field level to the servo controllers. The assemblies of the central chain drive and of the individual printing units were replaced with AM3000 synchronous servomotors and AX5000 EtherCAT Servo Drives, all from Beckhoff.

Decentralized operation: Stainless steel control panel

Four CP6607 Ethernet Control Panels with 5.7-inch touch screens and customer-specific displays replaced the previous operating panels. The design of the CP66xx series housing has a new, extra-smooth stainless steel front panel without edges or seams, making it ideal for use in the tough production environment of a screen printing plant. The panel design also avoids deposits of liquid or moisture, simplifies cleaning, and prevents the formation of the kind of persistent soiling that the inks and cleaning fluids used in a printing facility can cause. The buttons and switches on the panel are programmed as TwinCAT

In screen printing, the ink is spread with a doctor blade through a fabric pattern on to the component to be printed and is hardened by UV-light. OCTANT's printing line comprises a loading station, four printing units, and a removal unit.

network variables. With the help of real-time Ethernet, not much programming is needed to transmit button pushes in real-time.

Substantial refurbishment of the control equipment:

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Thanks to the open automation equipment from Beckhoff, the retrofit has brought the screen printing line up to 2011 technical standards: From the IPC, through the drive equipment and onto the I/O level, the components are perfectly matched to the existing plant. Only the control for the UV dryer and the sensor equipment used was not part of this substantial upgrade. David Derksen is aware of other aspects of a retrofit: "It is more than just a matter of restoring functionality by utilizing the latest equipment. We have an opportunity to comprehensively optimize the plant and therefore to improve it and increase productivity significantly." Plant operators were able to provide valuable influence on the project as early as the concept phase because of an analysis of the production process that occurred over several days prior to the retrofit.

Time window successfully met

A large proportion of the components were wired and tested at Beckhoff in advance. The time that this made available was used for intensive, on-the-job-training, involving customer-specific optimizations when getting the plant started. Stefanie Neuhaus is convinced by the result: "The equipment is running much more steadily and smoothly. Not only is it easier to operate, but there has also been a pleasant side-effect: The new drive equipment has markedly lowered the level of noise in the production department." TwinCAT and the precise regulation of the EtherCAT Servo Drives enable the individual process steps to be better matched to one another now. "During the supervised production start-up, the plain text fault messages were made to be more precise, and the menu control was adjusted so that the plant can now be operated more intuitively. Because this has shortened operators' reaction times, our productivity has risen and the amount of scrap has fallen," summarizes Stefanie Neuhaus.

Further Information:

www.octant.de

The CP66xx series Ethernet Control Panel is made of stainless steel. The design is flush-fitting, with no seams, and is ideal for application in potentially dirty production environments.

