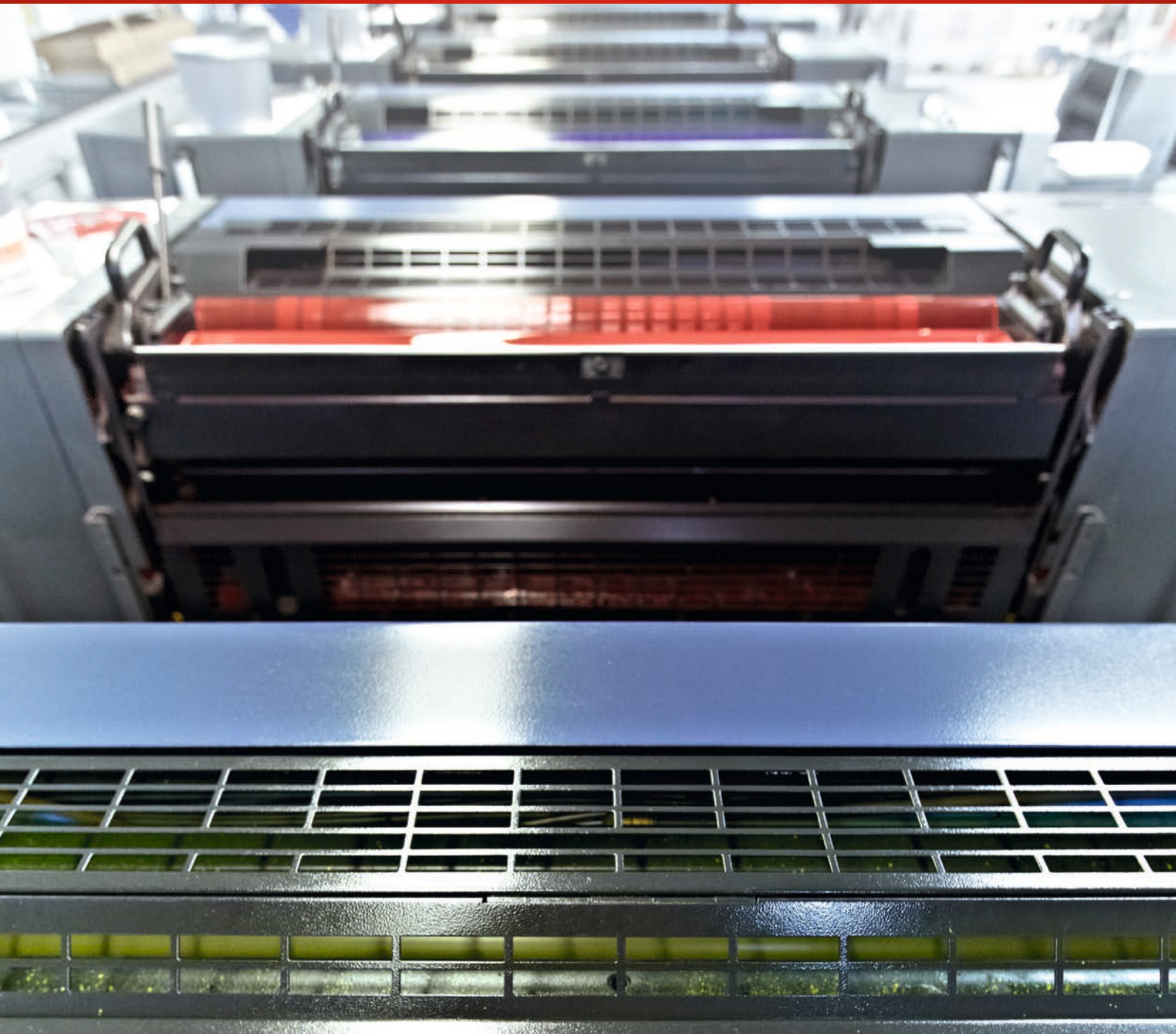
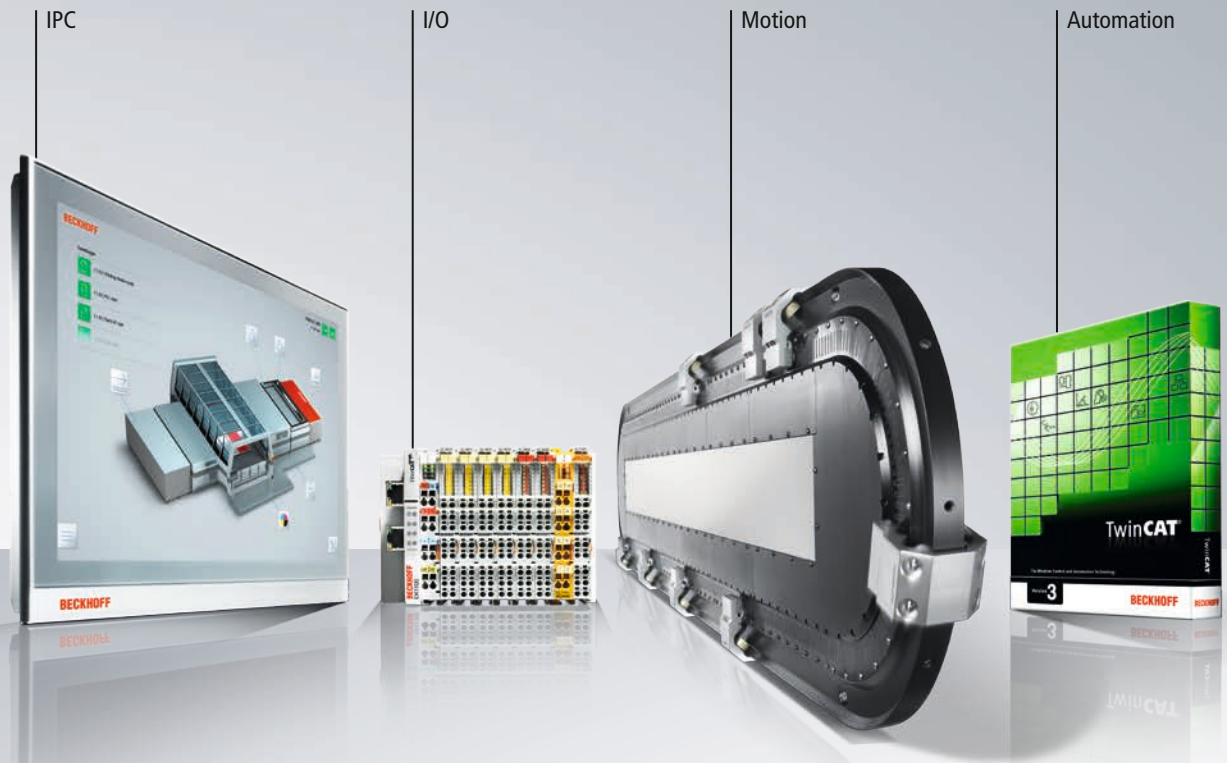


**BECKHOFF** New Automation Technology

# PC-based Control for the Print and Paper Industry





## PC-based control, the open and powerful control platform ...

Beckhoff offers a PC-based control solution well-suited to all areas of the print and paper industry. Because of its openness and universal design, PC-based control delivers significant technological and economic competitive advantages. Beckhoff is represented in more than 75 countries with 34 subsidiaries and distributors, ensuring global support for machine builders and end users in the local language. The company's continuous economic growth, coupled with high production capacities, guarantees delivery reliability and long-term availability. Robust, industry-proven components and the use of powerful, forward-looking IT and PC standards offer protection for technology investments.

\* as of 04/2016

Paper production



Web print and sheet print machines



Digital print technology



Gluing, folding, binding, transport



... for all areas of the paper and print industry.

The print industry has been facing many technological challenges in the recent years. On one hand, this comes as a result of shrinking print media markets and, on the other hand, increasingly varied requirements of different end customer markets in terms of maximum personalisation and process acceleration. Powerful PC- and EtherCAT-based automation technology provides answers to these pressing questions: because all control functions are integrated in software, even the most unusual requirements can be realised with minimal engineering effort by making use of standardised processes. High-precision automation and drive functions, as well as integration of robotics, measurement technology and analysis functions into the control platform, increase competitiveness and system availability.

► [www.beckhoff.com/print](http://www.beckhoff.com/print)

# Cloud S

Microsoft Azur  
Amazon Web S  
SAP HANA®  
TwinCAT Cloud

Slitting

- Digital print
- Web print
- Sheet print
- Flexo print

EtherCAT



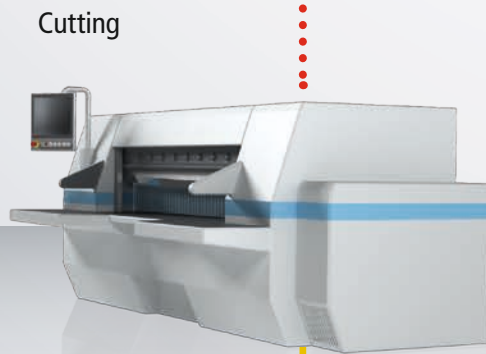
## Benefits along the entire line: Integrated PC-based control ...

PC-based control is based on a standard hardware and software platform that consists of an Industrial PC, EtherCAT as the high-performance bus system, distributed I/O components and drive technology. TwinCAT automation software provides a universal platform for engineering, processing, simulation and diagnosis of all control functions. Modular in design and precisely scalable in terms of performance requirements, PC-based control provides the ideal solution to automate individual machines, entire production lines and complete factories. The open hardware and software interfaces offer a high degree of freedom in machine design, enabling the integration of a wide variety of peripherals. All common fieldbus systems and software protocols are supported ensuring consistent communication from the field level, all the way to cloud-based systems.

# Services

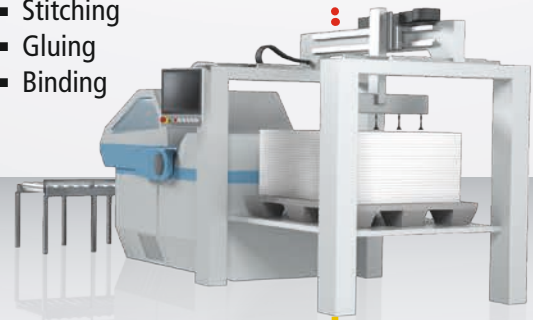
e™  
Services

Services



Cutting

- Folding
- Stitching
- Gluing
- Binding



## ... from paper production to folded inserts.

As requirements in the print industry continue trending towards end-to-end digital workflows, the goal is to fully network all sub-processes, from order preparation and prepress, through the print process, ending at post print and shipping. From a control perspective, this requires the capability to support a high level of communication and interface diversity, as well as the handling of large data volumes – requirements that can be optimally accomplished with PC- and EtherCAT-based control technology. The use of multi-core and many-core processors allows PLC, motion control, safety technology, robotics, measurement technology and HMI all to be implemented on a centralised control platform. This facilitates efficient communication between all system components and achieves maximum productivity.



Control Panel: Multi-touch displays and Control Panels



Industrial PC: Control cabinet and Panel PCs



Embedded PC: Compact IPCs with integrated I/O level

EtherCAT



EtherCAT I/Os: Broad I/O spectrum in IP 20 and IP 67

## The Beckhoff system for efficient and scalable control solutions ...

Beckhoff offers control solutions in all performance categories for the wide range of applications in the print and paper industry: from compact Embedded PCs with direct I/O connection, up to high-end Industrial PCs with multi-core processors. In addition, a wide range of Beckhoff multi-touch panels delivers state-of-the-art convenience for machine operators. The full range of sensors and actuators cover over 100 signal types and 1000 different Bus Terminals. TwinSAFE, a universal safety concept, integrates numerous essential safety functionalities – from PLC to I/Os to drive technology – into the standard control platform. The drive technology portfolio ranges from compact servo terminals to powerful EtherCAT-enabled servo drives and highly dynamic servo motors with One Cable Technology (OCT). The TwinCAT engineering and control platform forms the centrepiece of this PC-based control solution.



Highly dynamical servo drive technology



Servo terminals: Compact Drive Technology



XTS: Linear transport system

Linear motors



TwinSAFE: Integrated safety solution



TwinCAT: Software for engineering and runtime

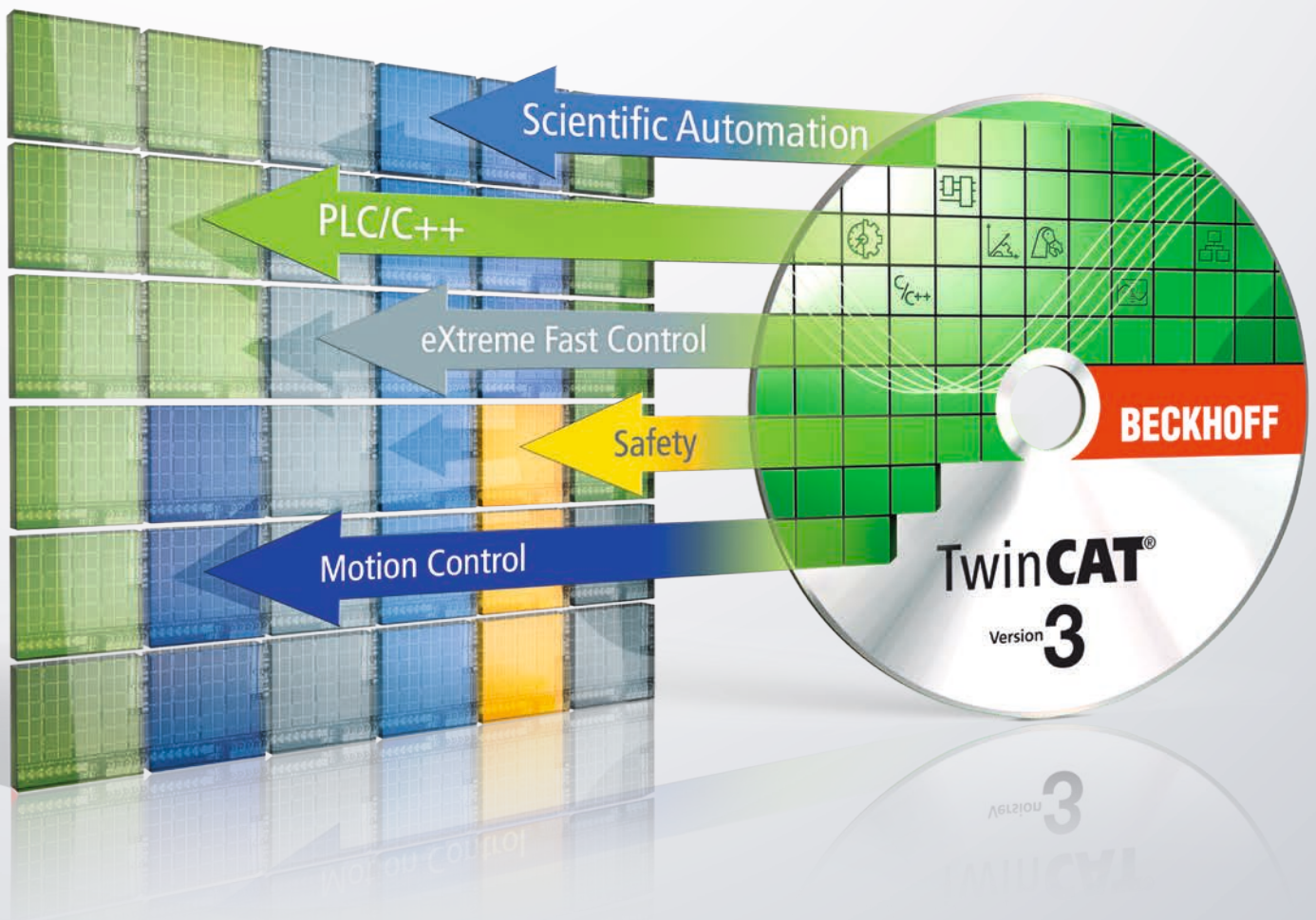




## ... for all steps in the paper and print industry

Beckhoff fulfils the diverse requirements of the varied machine types used in the print and paper industry, with the flexible scalability of its open and modular control solution in terms of computing power, performance and cost. Users can individually configure and dimension the control solution that best suits their machine type and performance requirements. Centralised or local control and drive concepts, implemented with Embedded PCs from the CX series and servo drives from the AX series in conjunction with high-speed EtherCAT-based communication through the entire machine, are just as possible as the dedicated control of digital print heads or integrated register control.





## TwinCAT, the universal software platform for engineering, runtime and modelling ...

TwinCAT includes all IEC 61131-3 automation languages and runtime multitasking components to create efficient automation solutions including configuration, programming and diagnostics, as well as advanced web-based HMI technology. Modules created in MATLAB®/Simulink® for highly complex control processes can be embedded in TwinCAT and operated in parallel with the automation process in real-time. Moreover, embedding C/C++ routines in the real-time context preserves existing software intelligence, enabling the seamless migration of existing intellectual property into the automation software platform. TwinCAT also enables effortless integration with existing IT infrastructures and different plant areas, as well as automated project creation for more flexible and modular machines.

► [www.beckhoff.com/TwinCAT](http://www.beckhoff.com/TwinCAT)





## ... simplifies the automation of complex processes.

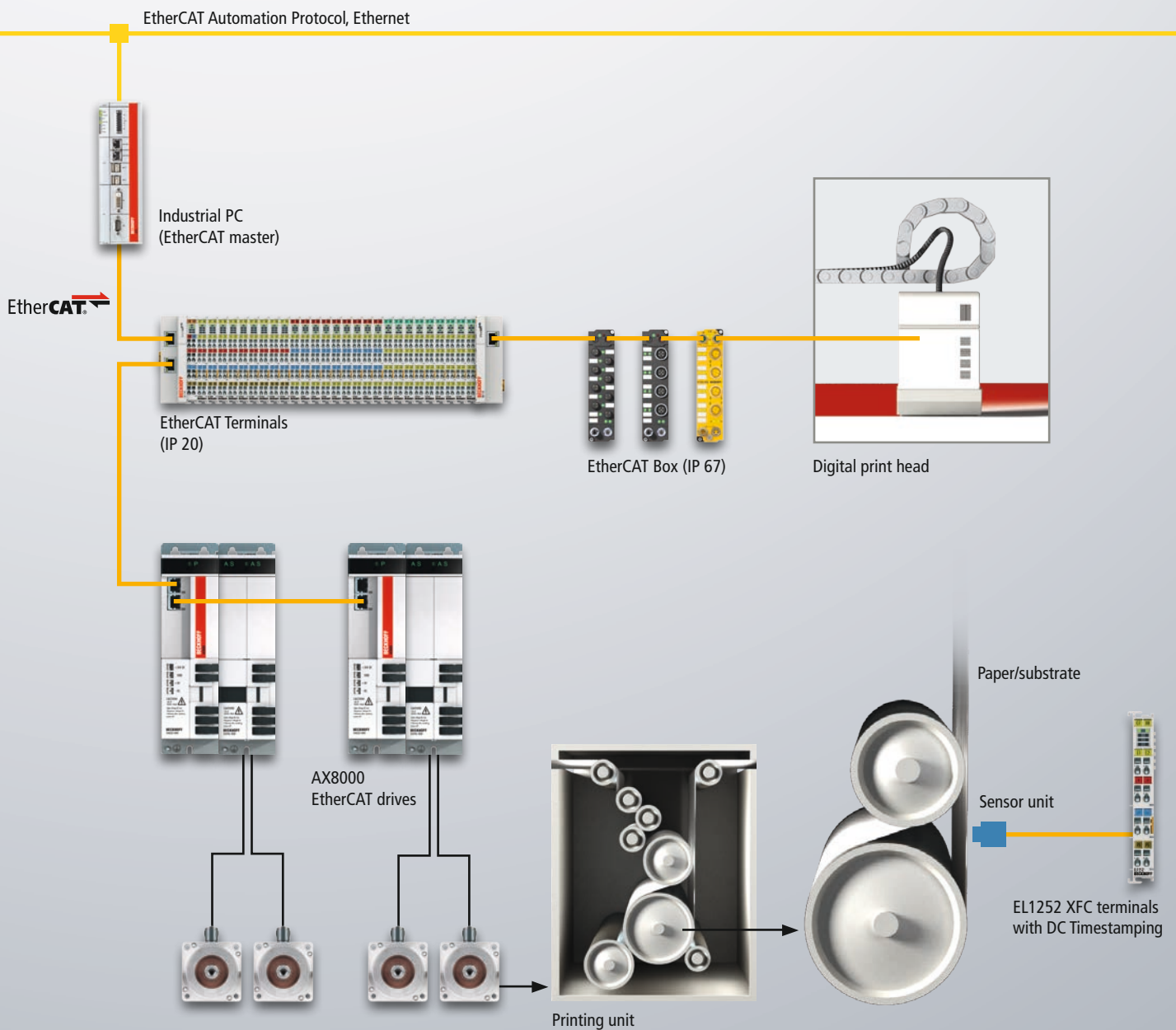
All functions in the areas of prepress, print and post print can be automated with the aid of TwinCAT as a universal PLC and motion control software suite. Users benefit from the use of multi-core processors – separate hardware components are no longer needed for the areas of infeed, robotics or conveyor systems. Comprehensive TwinCAT libraries are available for coordinated master/slave motion control functions or dedicated print functions, such as touch probe and register control, among others. The high-performance software platform can also be used for functions such as quality control of printed products on-the-fly, data logging synchronous to tasks cycles and analysis to enable predictive maintenance, or the implementation of IoT (Internet of Things) concepts on the basis of established protocols.



5420 | TC3 Motion Pick-and-Place

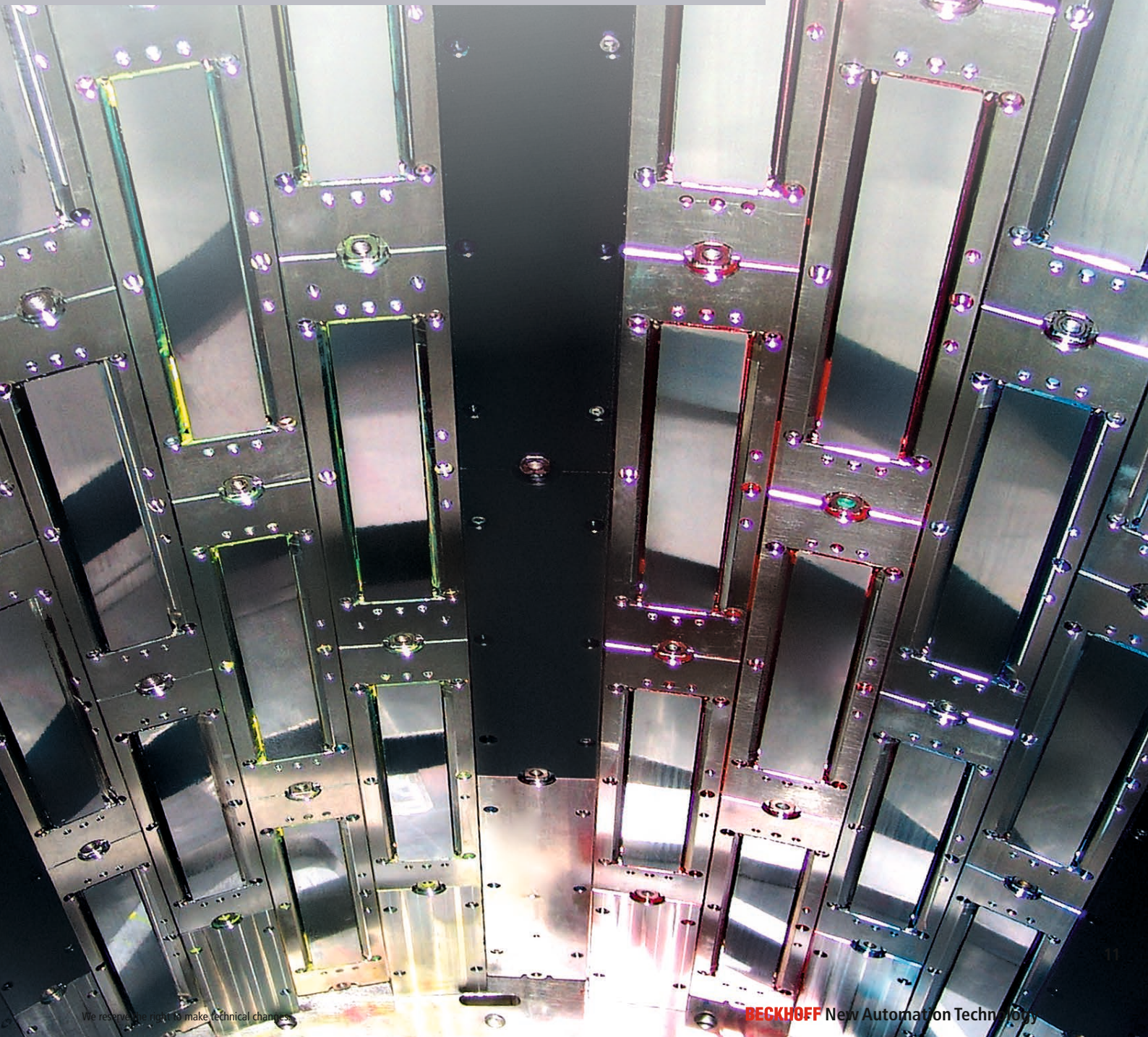
# EtherCAT and XFC, the standard for the print industry ...

The high-speed industrial Ethernet system, EtherCAT, provides the link for end-to-end process communication between I/Os, motion control, safety technology and the control PC. The ultra-fast reaction times and communication speed provided by EtherCAT leads to improved control accuracy, increases synchronisation precision and overall quality, while enabling greater productivity of all machines and units involved in the process. Moreover, some manufacturers in the area of digital print heads use EtherCAT as a technological base to meet the very detailed, high-precision control requirements for digital print heads. EtherCAT, TwinCAT automation software, powerful Industrial PCs and the ultra-fast I/O terminals with extended real-time capabilities provide the basis for an optimised control and communication architecture, which Beckhoff is offering with its eXtreme Fast Control (XFC) technology.



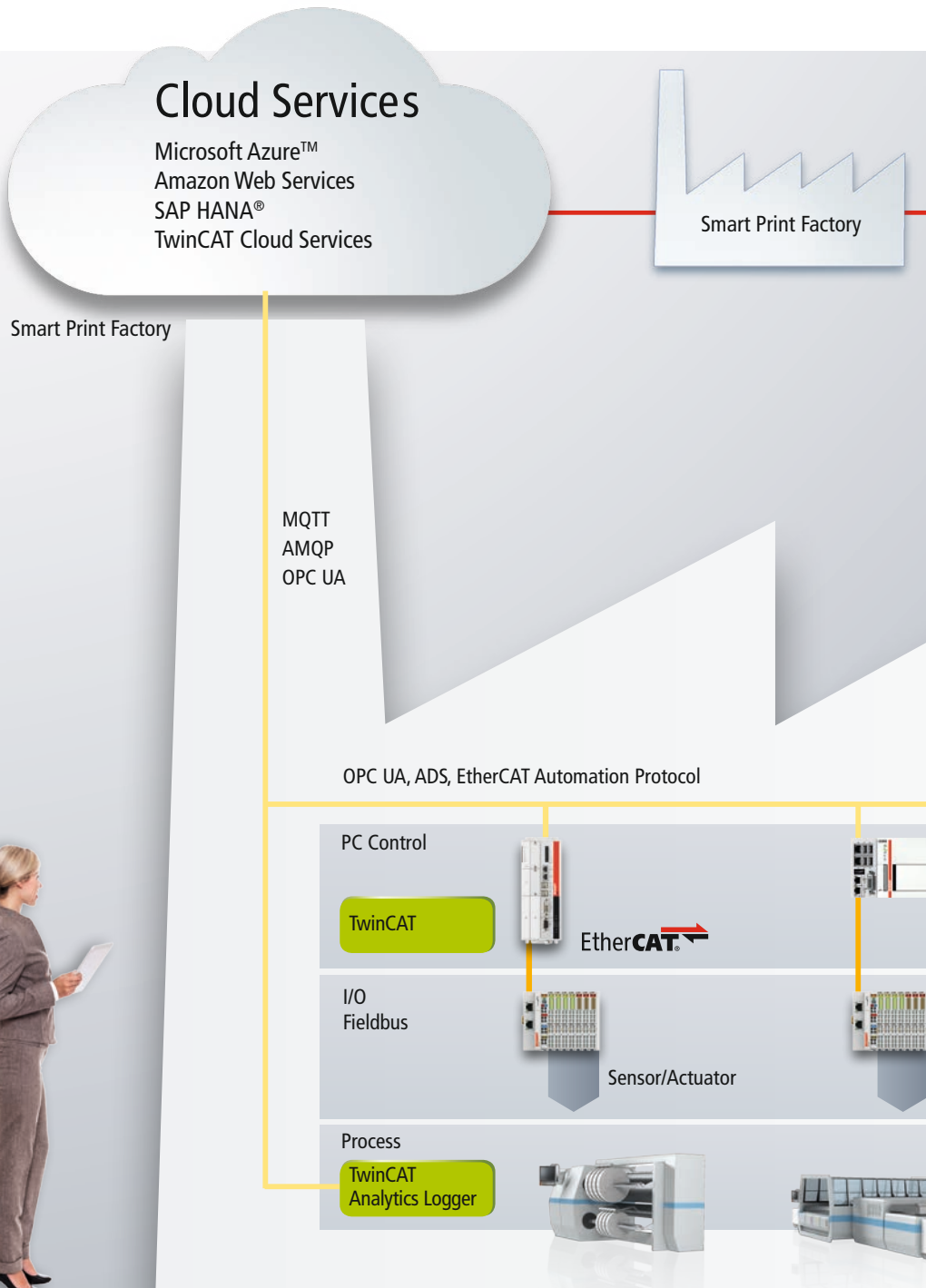
## ... increases precision and efficiency.

High-speed I/O response times of  $< 100 \mu\text{s}$  are achieved with eXtreme Fast Control technology, and events can be recorded with a resolution of  $< 100$  nanoseconds. The extremely fast and ultra-precise data communication enables applications with numerous new options and optimised processes, which previously could not be realised due to technical limitations. The high-performance and precision of the XFC I/O components allows replacement of special hardware, such as precise measurement technology devices for sampling register controls or for communication inside digital print heads. In all areas of the paper and print industry, starting with pre-print machines, covering print machines including their detailed technical challenges, down to post print equipment such as bundling, sorting and transport machinery, EtherCAT and XFC technology significantly leads to an increase of competitive advantages.



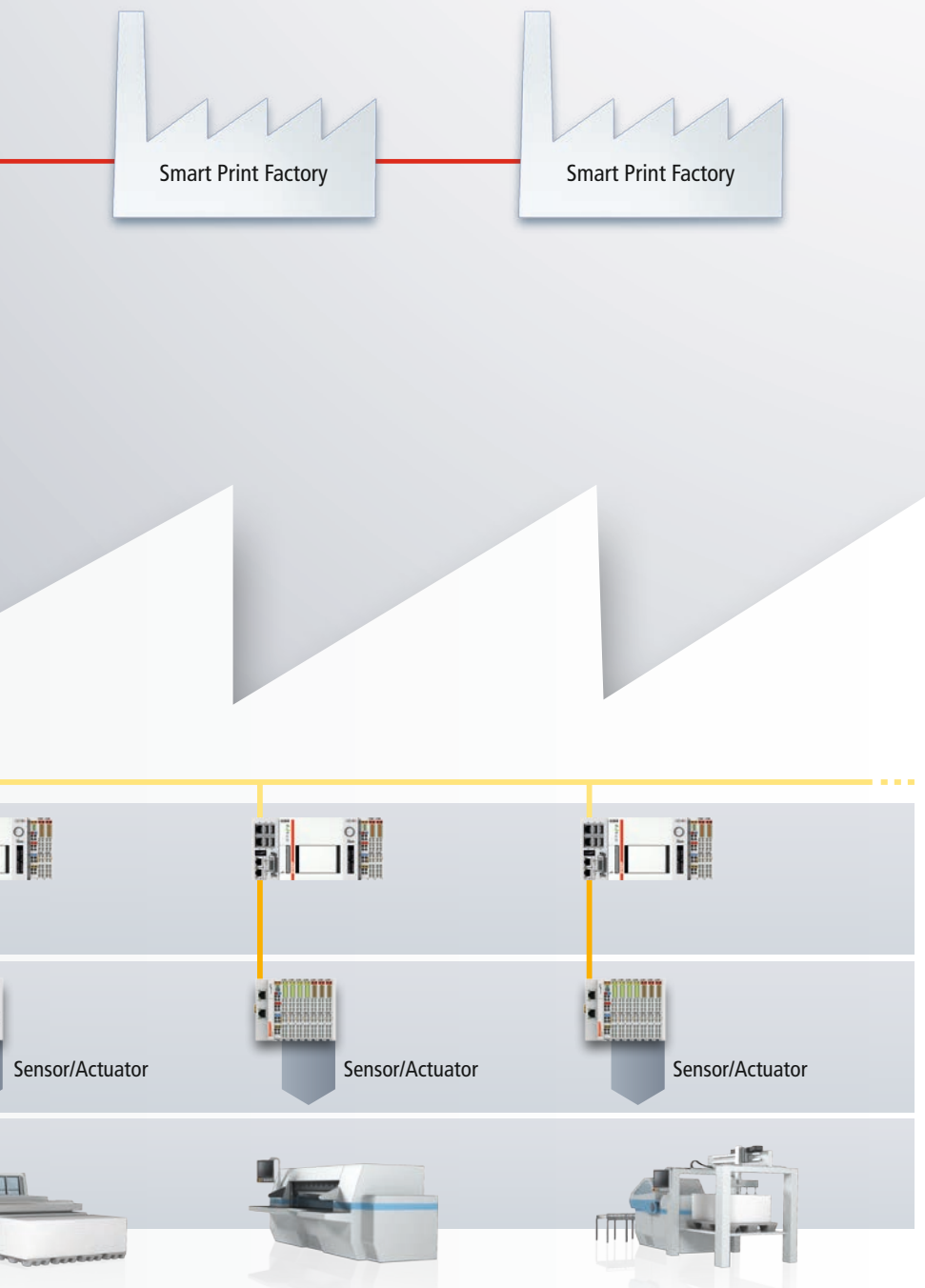
# Print 4.0 solutions based on PC Control and TwinCAT ...

Manufacturing and production processes in all areas of the print industry are subject of a fundamental change, moving in the direction of end-to-end digital workflows to meet the need for efficient process chains. Also there is the increasing trend towards personalised processing of print products. However, diverse requirements must be met to enable features such as online and offline state analyses, predictive maintenance, pattern recognition, machine optimisation and long-term archiving of data. The PC-based automation platform with standard industrial and IT-based communication interfaces offers the ideal base to enable these advanced functionalities. In addition to conventional PLC and motion control tasks, it also handles digital workflow applications, big data evaluations, cloud communication services, as well as other digital-based machine and end customer solutions.



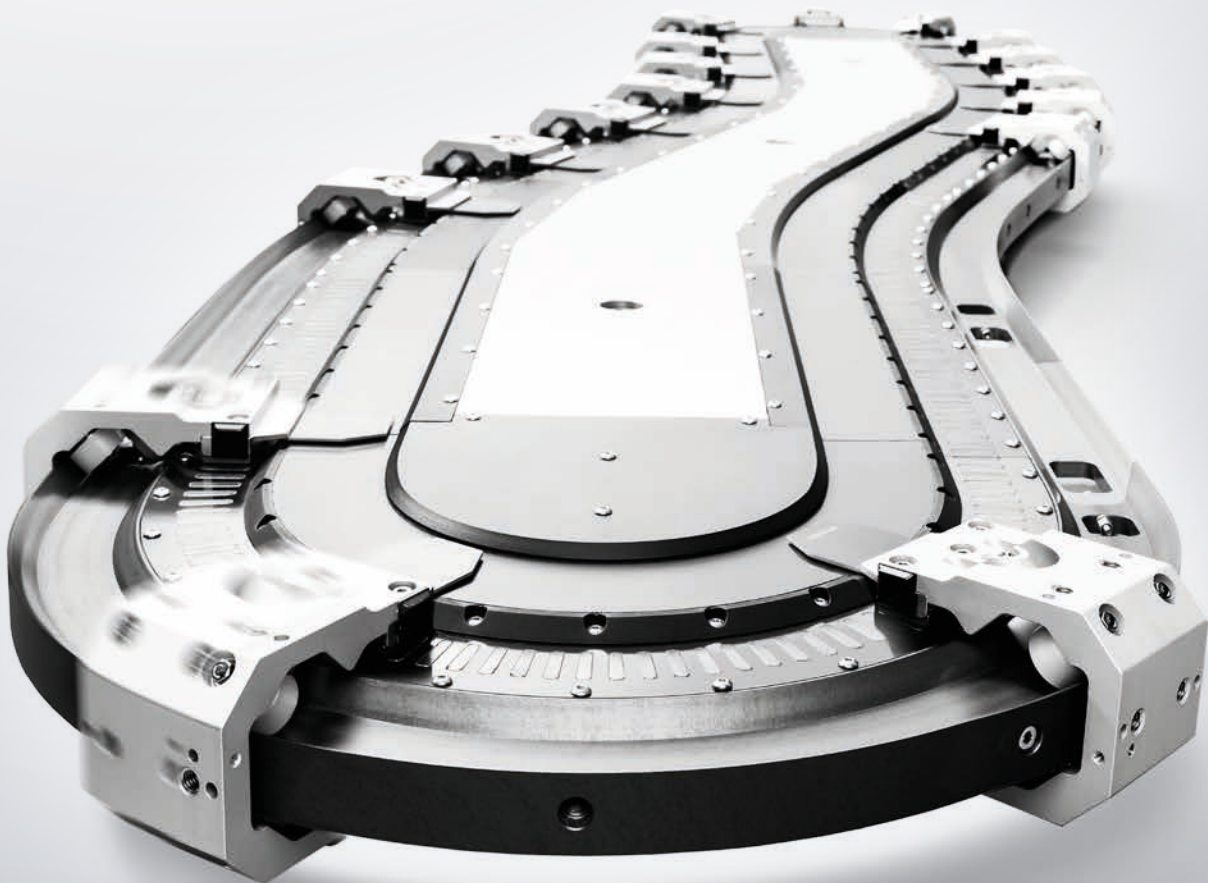
# ... secures competitiveness in the print industry.

TwinCAT IoT software provides support for the communication of production and/or content data with the cloud using standard protocols. The fast and easy configurable TwinCAT IoT provides a variety of functions for exchanging process data and accessing special data and communication services from either public clouds or local cloud systems and supports digital workflow processes. TwinCAT Analytics enables seamless acquisition of all machine data in direct synchronisation with the runtime cycles. It acts as the basis for comprehensive analyses that facilitate predictive maintenance for machines and reduces machine downtimes significantly. Cloud-based big data evaluation concepts can also be created in combination with TwinCAT IoT, ensuring sustained quality control of print processes and their subsequent post-processing.



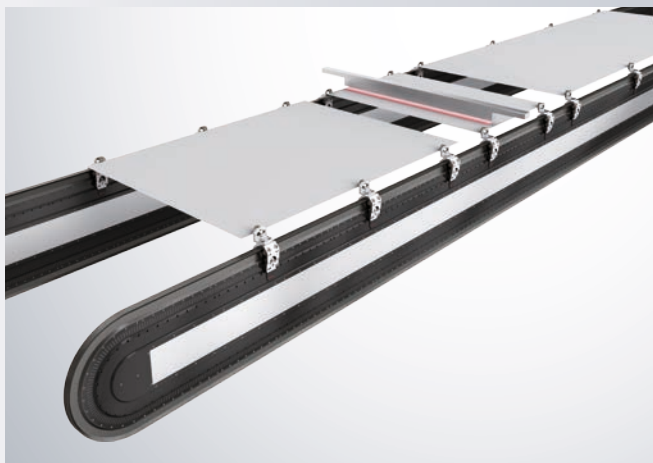
## eXtended Transport System: Software replaces mechanical components ...

XTS is a linear drive system with flexible track configuration and a variable number of movers, of which each can individually be positioned in high accuracy. XTS with its highly dynamic and flexible product transport is a core technology for Industrie 4.0 in the print and paper industry: movements are defined by digital workflow jobs and allow differing individual handling of goods in the print or post print process in series production speed without interruption. XTS offers machine OEMs the possibility of developing equipment with a high grade of innovation, resulting in lasting competitive advantages.

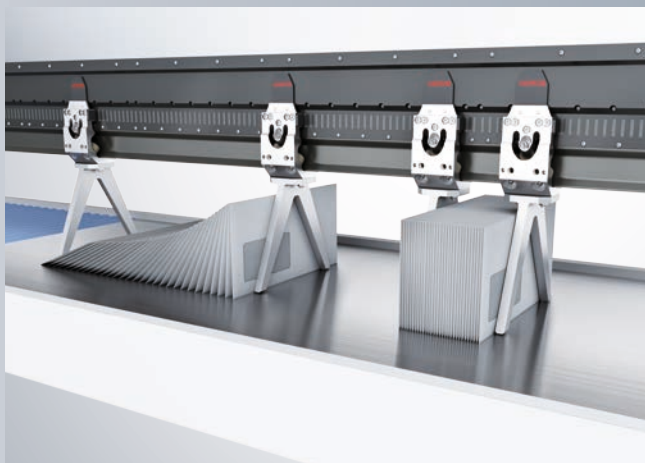


## ... and enables ultimate flexibility for transport and handling.

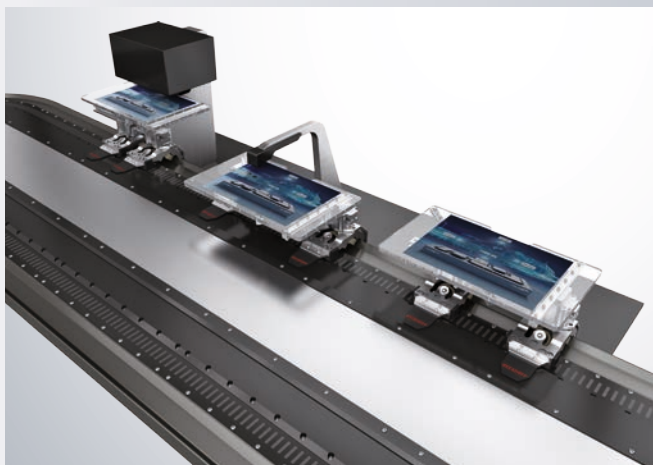
XTS allows a software guided, highly flexible and individual transport of print goods during the print or post print process in terms of format, size, quantity or weight. The flexible track configuration combined with mechanically coupled elements allows 2 D positioning in the horizontal plane, enabling a variety of applications in the field of printing: in the print process itself, where XTS moves the substrate beneath a print head, or in embossing processes or personalised post-processing. Specific TwinCAT software libraries support individualised sorting tasks, for example the transport of one or more different lot sizes of finished print products or the rapid transport of differently sized sheets of paper in a production process.



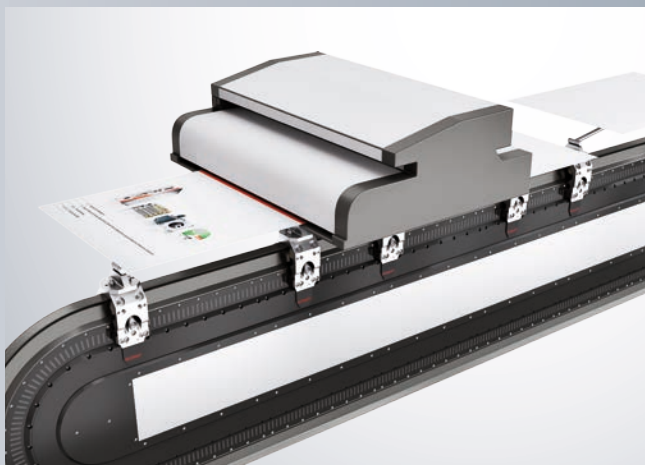
Transporting different size sheets in series production speed



Flexible on-the-fly batch processing in sorting machines



Specifically coupled elements enable X-Y movements for further processing steps.



XTS as an innovative print head transport unit



## EtherCAT drives for highly dynamic positioning tasks ...

Scalable drive solutions, combined with intelligent motion control functions in TwinCAT, cover a broad range of functions: starting with the compact servo terminals in conjunction with the small drive technology for e.g. fast and precise processing of lighter-weight products, up to the powerful EtherCAT servo amplifiers in the AX8000 and AX5000 series. The integrated fast control technology of the AX series supports rapid and highly dynamic positioning tasks, while the comprehensive portfolio of linear and rotary servomotors perfectly complements the range of servo drives. The AM8000 motor series features One Cable Technology (OCT), which combines power and feedback systems into a single standard cable. In terms of installation and machine footprint, users can achieve considerable savings with OCT technology.





... ensure optimum precision along the entire process chain.

Complex web and sheet transportation as well as positioning print machinery equipment can be realised with Beckhoff Industrial PCs, XFC technology for high-speed data acquisition and EtherCAT servo drives. Throughout the entire print process, the products and/or raw materials are transported with micrometre accuracy and – based on TwinCAT software technology functions – corrected in detail in case of process-related deviations. XTS additionally offers the possibility of personalised processing in series production as an extension of existing systems or for innovative reorientation of equipment in the print process and/or in post print stages.

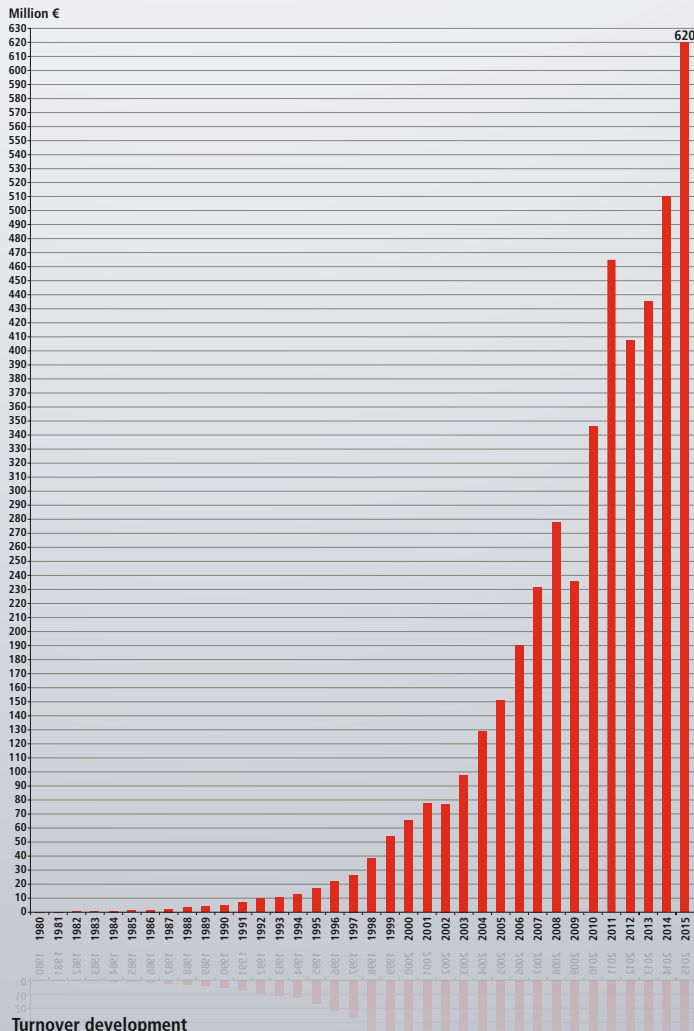
# Beckhoff – New Automation Technology

Beckhoff implements open automation systems on the principle of PC-based control technology. The product range covers the main areas of Industrial PCs, I/O and fieldbus components, drive technology, and automation software. Product ranges are available for all industries which function as individual components or in a group – as a complete, coordinated control system. “New Automation Technology” from Beckhoff stands for universal control and automation solutions for all industries that are used worldwide in a large variety of applications, ranging from CNC-controlled machine tools to wind turbines to intelligent building control.

► [www.beckhoff.com](http://www.beckhoff.com)

# Beckhoff at a glance

- Headquarters: Verl, Germany
- Sales 2015: 620 million € (+22 %)
- Staff worldwide: 3,000
- Branch Offices Germany: 14
- Subsidiaries/Branch Offices worldwide: 34
- Distributors worldwide: in more than 75 countries (as of 4/2016)



# Worldwide presence on all continents

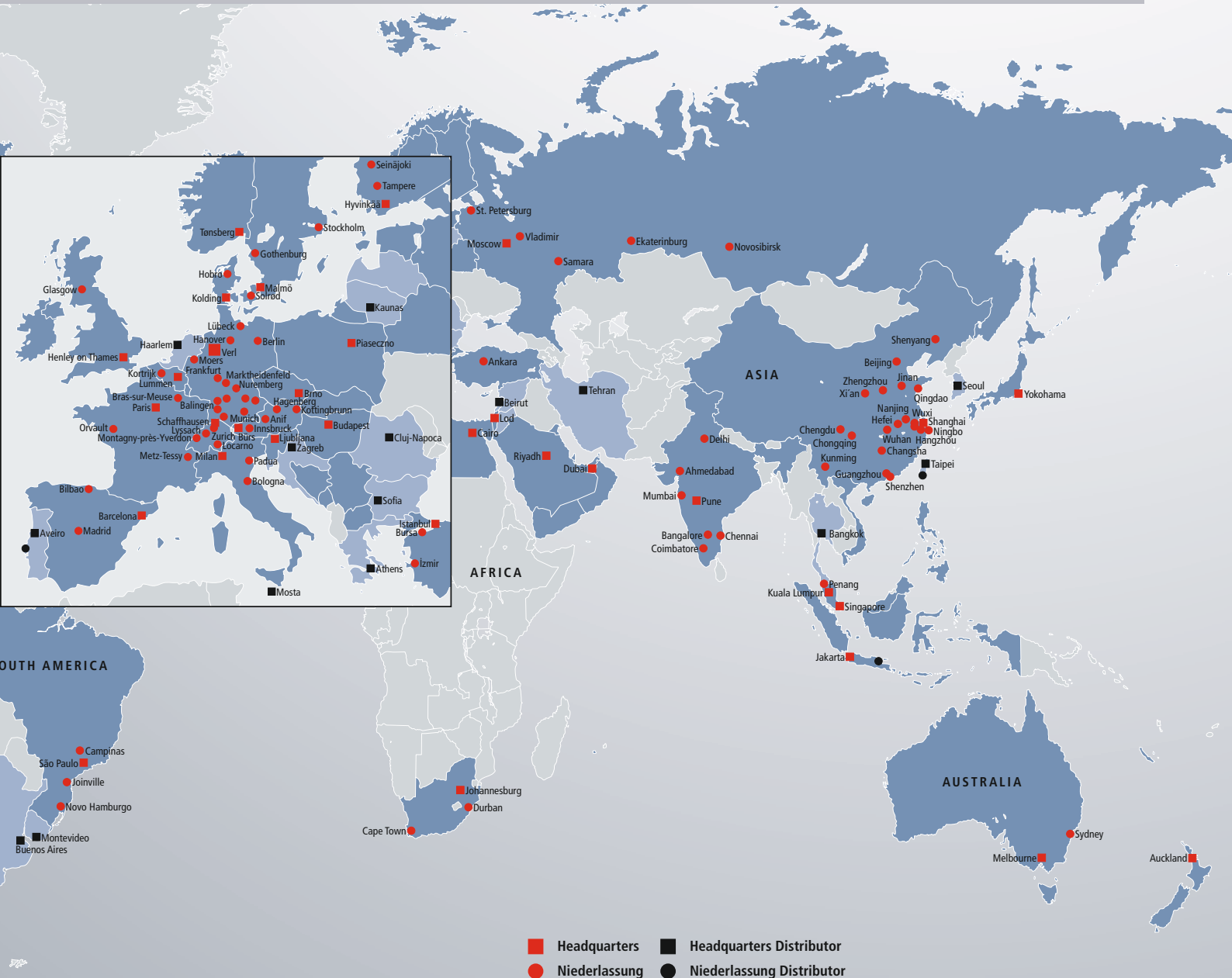
With local presence in more than 75 countries, Beckhoff ensures fast service worldwide and technical support in the local language for globally operating customers. In addition, Beckhoff sees close geographic proximity to the customer as a prerequisite for a profound understanding of the technical challenges facing customers.

# Further information

The Beckhoff webpage "PC-based Control for the Print and Paper Industry" contains additional information and solutions. [▶ www.beckhoff.com/print](http://www.beckhoff.com/print)  
 All Beckhoff catalogs and flyers are available for download from our website. [▶ www.beckhoff.com/media](http://www.beckhoff.com/media)

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