BECKHOFF New Automation Technology
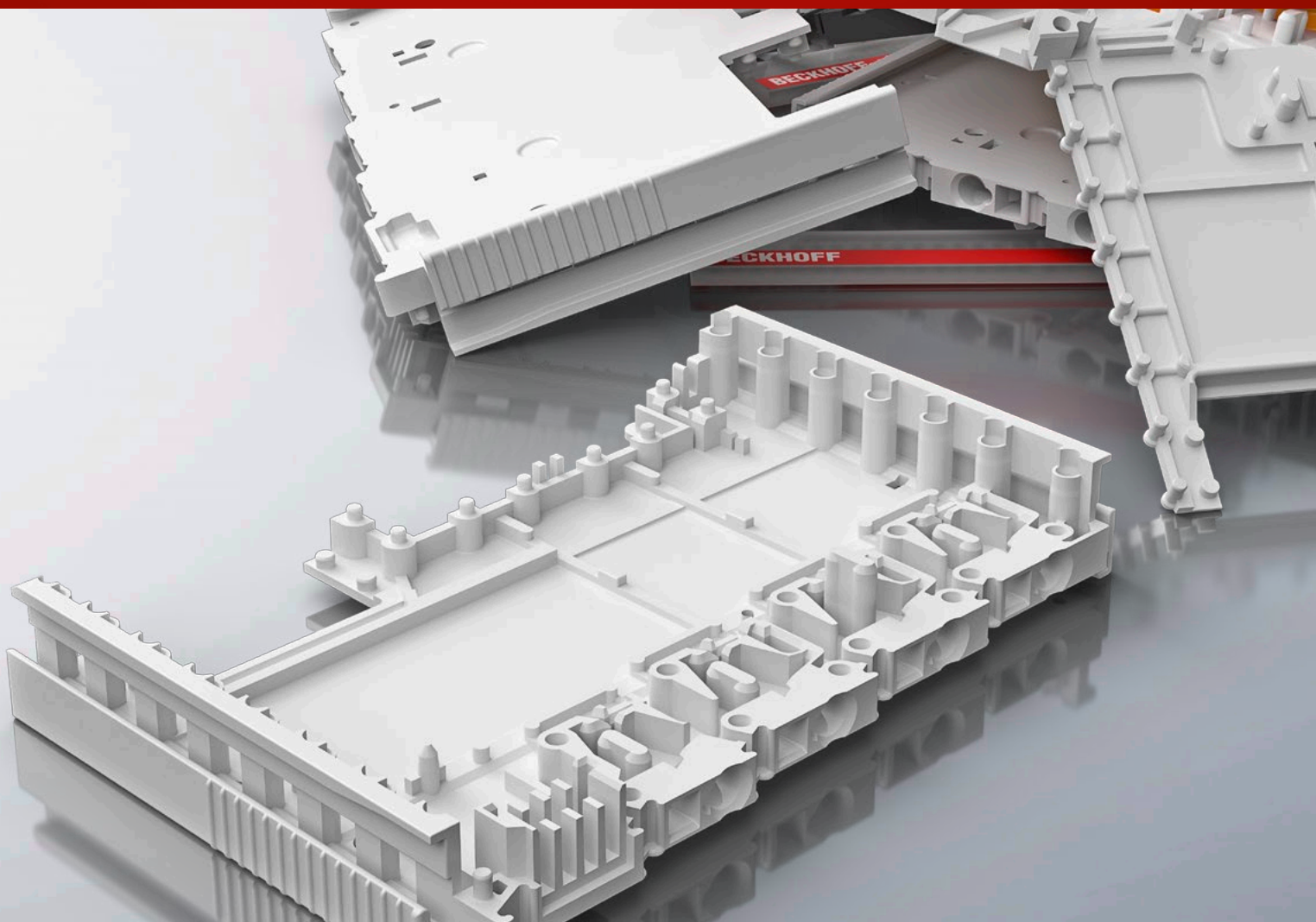
PC-based control
for plastics machines

# Open automation technology for plastics machines

As a dynamic growth market, the plastics industry is under high cost pressure worldwide. At the same time the requirements for the product quality as well as the productivity and energy efficiency of plastics machines are increasing. Beckhoff offers plastics machine manufacturers genuine competitive advantages with PC- and EtherCAT-based control technology and the integration of common communication standards, which are standardized according to Euromap and OPC UA. Thanks to its high performance, modular design and precisely scalable capacity, the technology is suitable as a universal hardware and software platform for controlling individual machines and complete systems. The range of applications include injection molding, blow molding, extrusion and integration of production cells. Since all control functions are mapped in software, even complex requirements can be implemented with little engineering effort.

In addition to turnkey system solutions, Beckhoff supplies standard individual components, which allow machine manufacturers to configure controllers that are individually tailored to their applications. Machine manufacturers can contribute their own process expertise, be it for a new ma-

IPC
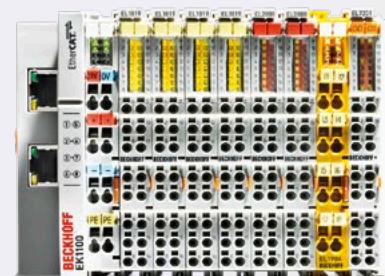
I/O

chine series or for retrofitting existing machines. In addition, open hardware and software interfaces offer machine manufacturers high degrees of freedom in machine construction. They facilitate integration of a large number of different equipment, including devices from third-party manufacturers. The Beckhoff control platform, based on industry and IT standards, supports the implementation of Industrie 4.0 concepts for machine-to-machine communication and for data processing and analysis in the cloud.
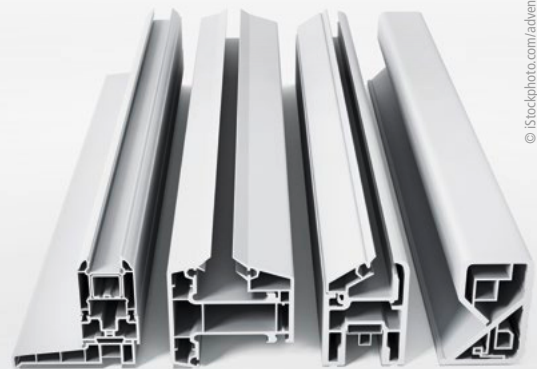
Injection molding

Blow molding

Extrusion

Production cell

Motion

Automation

Injection molding machines and production cells with universal engineering platform

The Beckhoff solution for the plastics industry is based on an integrated hardware and software platform. It comprises an extensive portfolio of Industrial PCs, EtherCAT as a fast communication system, decentralized I/O modules, drive technology components and TwinCAT automation software. TwinCAT serves as a software platform for engineering, runtime and diagnostics of all control functions, including PLC, Motion Control, CNC, robotics, HMI, vision, safety and measurement technology, cloud communication and analysis functions. Firstly, this ensures the efficient interaction of all system components and thus maximum productivity. The consistent implementation of all functionalities in the form of software modules eliminates the need for special devices. This not only reduces the hardware costs but also the engineering effort and the lifecycle costs.

Support for vendor-independent Euromap standards based on OPC UA, EtherCAT as a fast fieldbus and TwinCAT as an integrated engineering platform means that a wide range of variants of heterogeneous production cells can be realized with the Beckhoff control system.
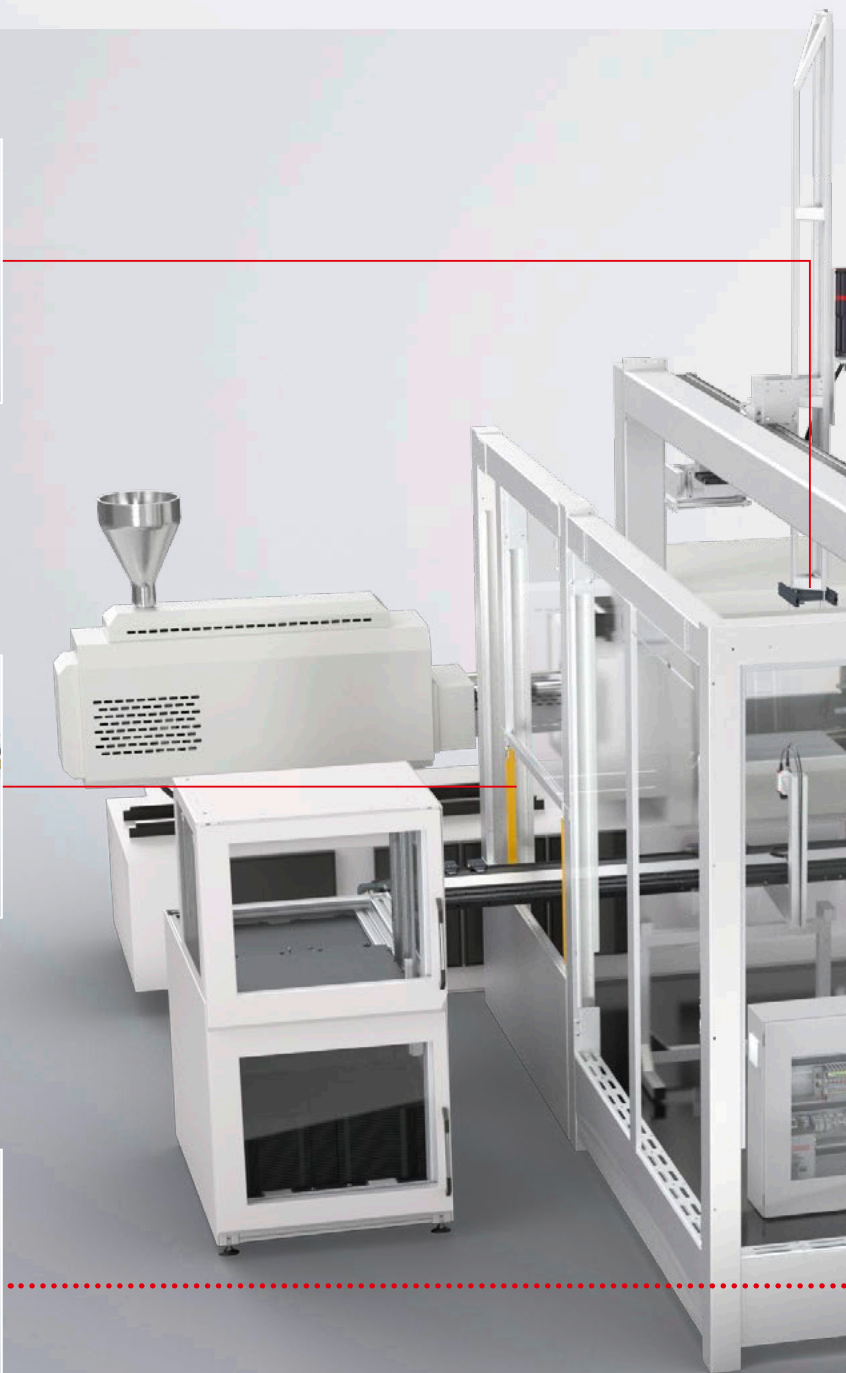
IP 67 modules for space-saving setup and special functions such as pneumatic pressure measurement

TwinSAFE, the open and scalable safety technology

realization of heterogeneous production cells via different fieldbus systems

Display devices with different diagonals and orientations – implemented as integrated Panel PC or as pure display panel – open up a wide range of options for user-friendly machine design.
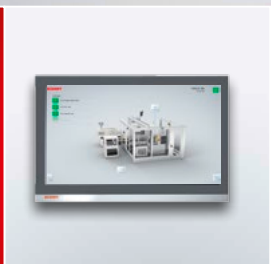
distributed Servo Drive system AMP8000

TwinCAT, the software platform for all control functions, including robotics and linear conveying systems

customer- and industry-specific Control Panels

Extrusion lines and production cells with universal engineering platform

The Beckhoff control portfolio provides the basis for innovative control concepts in extrusion technology. Extensive functions for controlling extrusion processes in software can be implemented with the TwinCAT egineering tool, without the need for special hardware. The core component of the software solution is the proven Beckhoff temperature controller, which has been specially developed for extrusion applications such as pipes, profiles, sheets or films. In addition, various technology blocks are available for dosing and weighing or for mass pump control. The control of caterpillar haul-off and cutting devices as well as winders is carried out by means of special engineering modules in TwinCAT.

Energy measurement is considerably simplified with the Beckhoff power measurement terminals: for new plants, it is integrated in the system; for retrofitting existing extrusion lines, cost-effective solutions are available in the form as a small controller with attached power measurement terminals.

Beckhoff offers machine manufacturers future-proof solutions for the integration of downstream

TwinCAT, the universal automation platform

cloud-based automation with TwinCAT IoT and Analytics

quality control through integrated image processing: TwinCAT Vision

integration of down-stream devices via Euromap and CANopen; sensor communication via IO-Link

EUROMAP
European Plastics and Rubber Machinery

CANopen

IO-Link

equipment via OPC UA interfaces or sensor communication via IO-Link. CANopen interfaces are available for existing systems. The PC-based control principle from Beckhoff supports cloud communication – also for retrofitting existing machines – and thus enables the aggregation of data in worldwide production networks.

The simulation of digital filters and special controllers for innovative measurement and control systems is simplified, based on the perfect MATLAB®/Simulink® integration in TwinCAT.
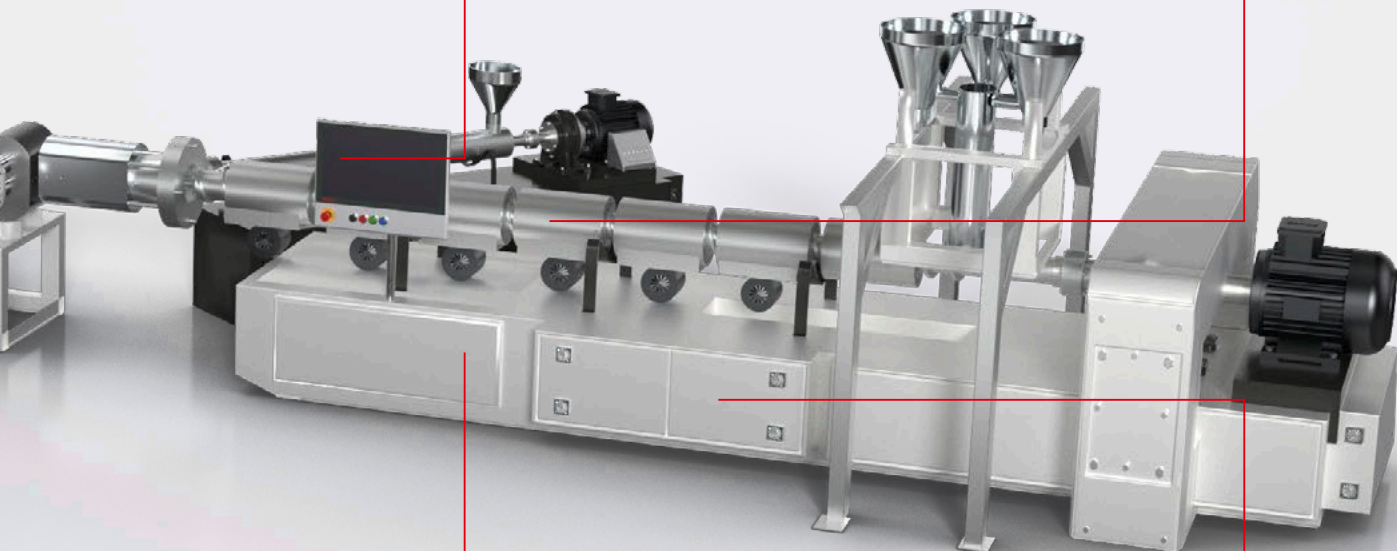
customer- and industry-specific Control Panels

temperature mea-surement directly at the machine via IP 67 modules

Embedded PC CX: Industrial PC with directly integrated I/O level

power measurement terminals simplify energy logging

PC-based control: scalable and modular control solutions for the plastics industry

With its open, precisely scalable and modular control technology, Beckhoff meets the requirements of the plastics industry for performance-oriented and cost-effective solutions. The modular system enables users to assemble the right control solution for their system or plant type. The Beckhoff automation toolkit comprises an extensive portfolio of Industrial PCs as well as operating and display devices in all performance categories and form factors. EtherCAT, the world standard for real-time communication, offers maximum performance during integration of power controllers also from third-party suppliers. The Beckhoff I/O system covers a wide range of sensors and actuators and supports interfaces to various fieldbus systems. The EJ modules offer an efficient and compact solution for high-volume series machines. With TwinSAFE, Beckhoff has developed an integrated safety solution that reduces engineering costs thanks to its flexibility, especially for production cells. Servomotors and Servo Drives of all performance classes are available for the axis movement of electrically driven machines. TwinCAT, the Beckhoff automation software, comprises comprehensive Motion Control software packages for electrical machines as well as proven function

blocks for hydraulic machines. These functions are supplemented by software libraries for Euromap/OPC UA connection and the TwinCAT Plastic Application Components, which incorporate Beckhoff's many years of experience in the plastics industry.

EtherCAT: integrated real-time fieldbus for ultra-fast process communication
▶ **www.beckhoff.com/ethercat**

Control Panel: multi-touch display and control panel
▶ **www.beckhoff.com/multitouch**

TwinCAT: software for engineering and runtime
▶ **www.beckhoff.com/twincat**

Industrial PC: control cabinet PC and Panel PC
▶ **www.beckhoff.com/ipc**
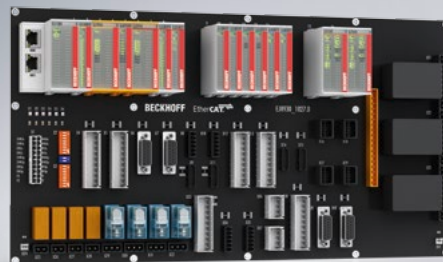
EtherCAT I/O plug-in modules: for large-scale machine production
▶ **www.beckhoff.com/ethercat-plug-in-modules**

EtherCAT I/O: complete I/O system in IP 20 and IP 67
▶ **www.beckhoff.com/io**

Compact Servo Drives
▶ **www.beckhoff.com/drive-technology**

TwinSAFE: integrated safety solution
▶ **www.beckhoff.com/twinsafe**

Open automation technology with EtherCAT: ideally suited for injection molding machines

The extensive Beckhoff I/O and drive technology portfolio and a wide range of high-performance PCs offer machine manufacturers every opportunity to meet market requirements. EtherCAT, the fast communication solution developed by Beckhoff, acts as the "nervous system" of the injection molding machine. I/O components and drive technology are coupled with the central CPU via EtherCAT with maximum data transfer rate. In addition to the IP 20 terminals from Beckhoff, customer-specific I/O with integrated backplane in the form of EJ modules is particularly suitable for cost-effective and fail-safe large-scale machine production. Electronic safety technology meets the growing requirements for machine safety, even in complex production cells, in a future-proof manner. Together with fast Servo Drive technology, the EtherCAT-based eXtreme Fast Control Technology (XFC) offers maximum precision and energy efficiency, particularly for servo-electric machines.

customer- and industry-specific Control Panels

TwinCAT Plastic Application Components: control and visualize core functions of plastics machines

I/O modules for circuit boards: ideally suited for large-scale machine production

fast Servo Drive technology

Open automation technology: minimizes the energy consumption of electric blow molding machines

Beckhoff offers control components in software and hardware for extrusion blow molding machines with hydraulic or electric drive technology of any size: A comprehensive portfolio of Servo Drive technology is available for servo-electric machines. In conjunction with the technology modules for motion control, customers benefit from proven technology for any drive concept. If required, ready-made software modules can replace the programming of the machine.

A wide range of operator panels is available for a user interface that is optimally tailored to the application. Based on blow molding specific HMI objects in the TwinCAT HMI software, the machine manufacturer can customize the user interface according to his requirements. For larger systems, the IP 20 terminals in conjunction with EtherCAT enable space-saving decentralized installation and thus reduce cabling requirements. TwinSAFE, the system-integrated safety technology from Beckhoff, and EtherCAT for fast data connection are ideal for implementing a safety solution for complex production cells.

distributed Servo Drive system AMP8000

TwinCAT Plastic Application Components: control and visualize core functions of plastics machines
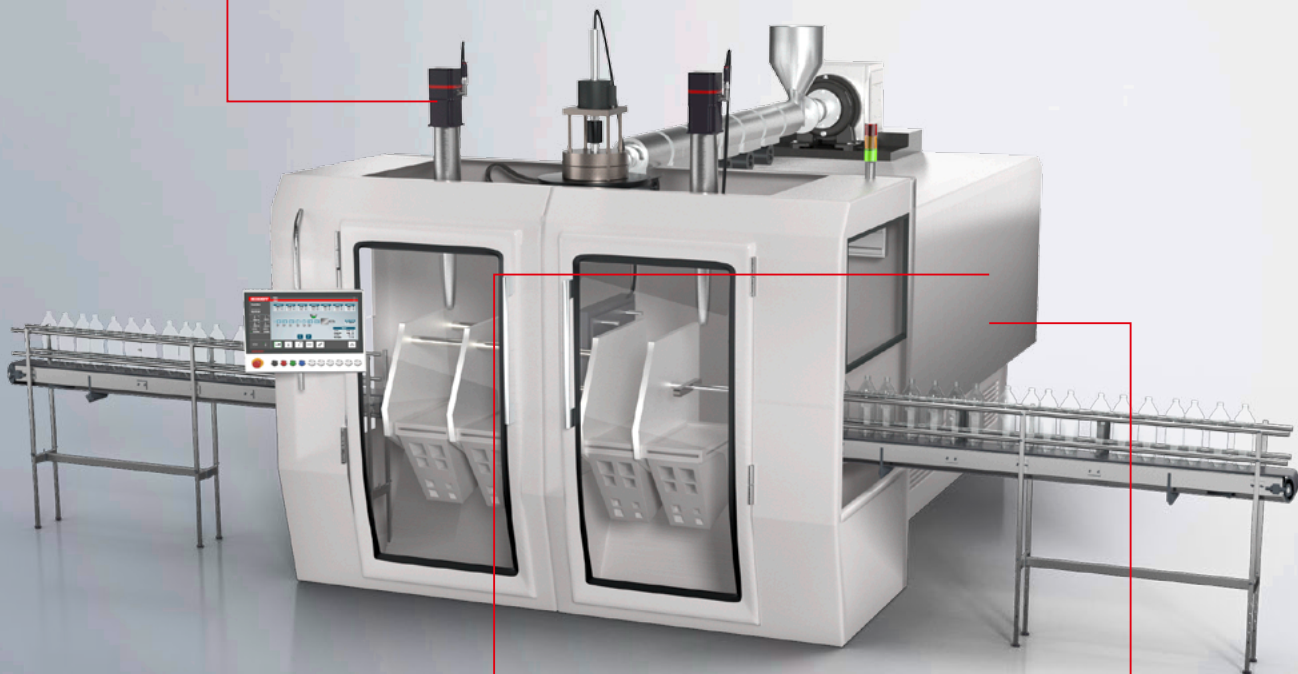
complete, modular I/O construction kit

fast Servo Drive technology

Open automation technology with fieldbus diversity: ideally suited for extrusion lines

Depending on the system version and size, Beckhoff offers Control Panels in different form factors and in customer-specific designs, if required. With TwinCAT HMI, machine manufacturers can easily customize the user interface based on ready-made HMI objects. The technology software for temperature control developed by Beckhoff is suitable for extrusion barrels and dies with a high heat capacity. Controllers optimized PID structure exhibits a dynamic step response with low overshoot.

The interfaces commonly used for extrusion applications, such as Ethernet, CANopen, IO-Link or Profinet are available. Preparations have been made for the upcoming Euromap standards based on OPC UA. This makes M2M communication and integration into master computer and cloud systems a reality. Special measuring terminals are available for measuring technology applications such as gravimetry or layer thickness measurement, as well as Condition Monitoring. Redundant sensor data acquisition, e.g. for melt pressure and temperature to ensure safety requirements, is implemented using TwinSAFE SC technology.

TwinCAT Plastic Application Components: control and visualize core functions of plastics machines

EtherCAT measurement terminals for Condition Monitoring
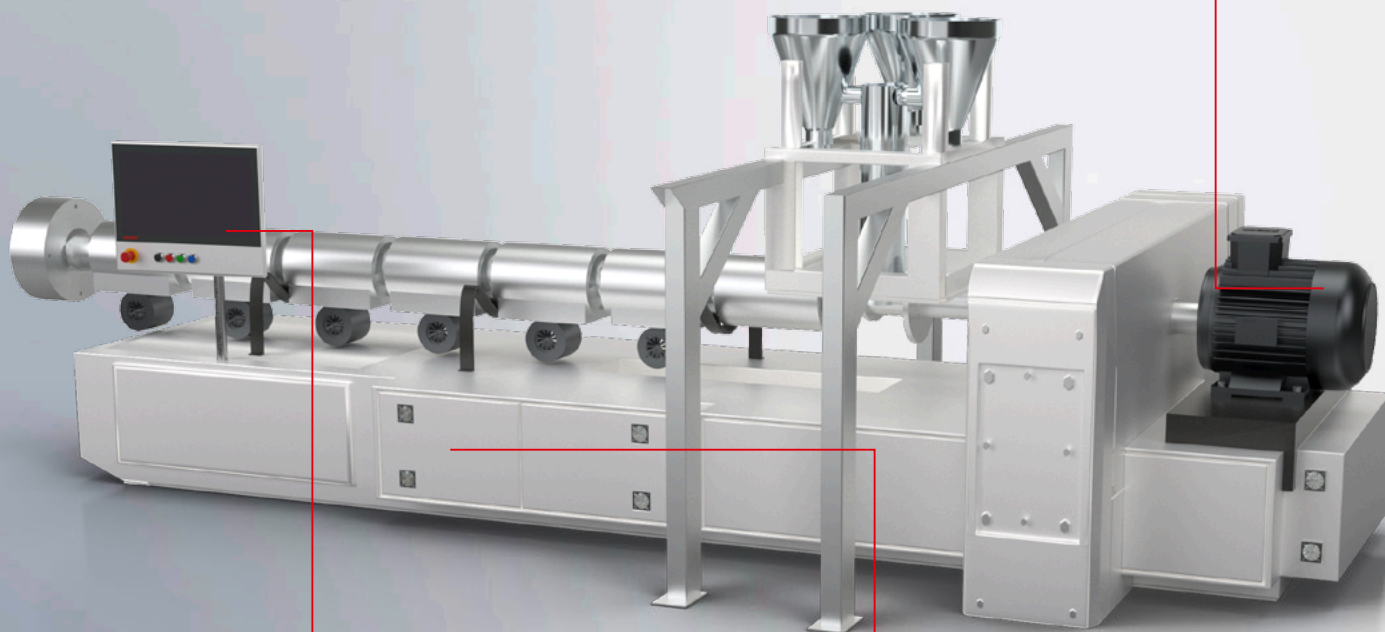
customer- and industry-specific Control Panels

power measurement terminals simplify energy logging

# Open automation technology with Euromap interfaces for production cells

The integration of production cells and independent communication between individual machines and system components is becoming more and more important as part of efforts to increase the efficiency of plastics machines. In order to ensure secure and reliable data exchange between heterogeneous plant components, the components must communicate via an interoperability standard, as implemented by the Euromap organization. Beckhoff has integrated all approved Euromap standards into its control system, based on OPC UA.

For highly dynamic applications, EtherCAT is the basis for practically delay-free synchronization between machines and robot movements. The TwinCAT software supplements for motion control support a wide range of applications for handling devices, perfectly complementing the Beckhoff Servo Drive technology. TwinCAT Vision integrates optical quality control into the production cell without separate image acquisition systems. Gripper functions are monitored by air pressure sensors in protection class IP 67.

TwinCAT, the software platform for all control functions, including NC I and robotics

TwinSAFE, the open and scalable safety technology
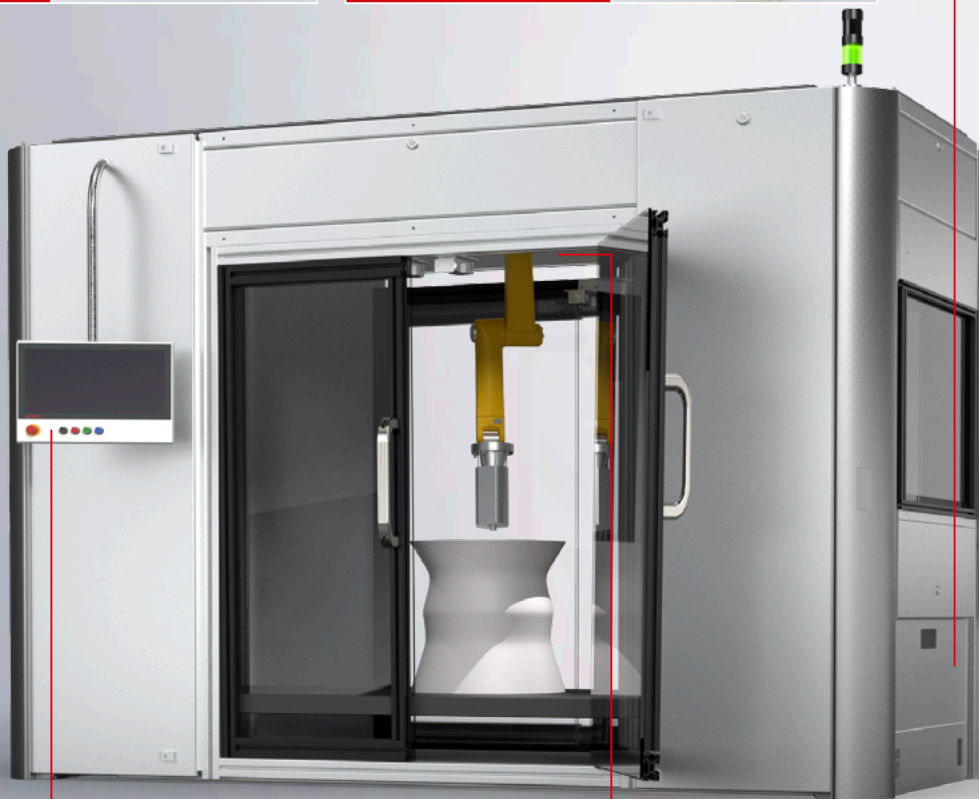
customer- and industry-specific Control Panels

IP 67 modules for space-saving setup and special functions such as pneumatic pressure measurement

EtherCAT, the fast fieldbus: global standard for plastics machines

The EtherCAT technology was launched on the market by Beckhoff in 2003 and made available as an open standard for automation technology. With outstanding performance, flexible choice of topology, comprehensive diagnostics and simple configuration, EtherCAT is ideally suited for use in plastics machines. Beckhoff offers the largest number of EtherCAT-compatible automation modules for I/Os and for drive technology. Using the EtherCAT P standard, the AMP distributed Servo Drive system is supplied with power and data via a single cable, thus saving mounting space in the control cabinet. This is particularly interesting for production cells with different drive technologies.

EtherCAT is one of the most widely used standards in plastics technology. A large number of EtherCAT-compatible sensors and actuators are available on the market, which guarantees a high level of investment security. Particularly interesting for electrically driven injection molding machines is the problem-free connection of drives from third-party suppliers. Other fieldbus systems such as CANopen, IO-Link and Profinet, can also be integrated as communication layers in plastics machines via EtherCAT. Future TSN implementations will be realized on the basis of the EtherCAT automation protocol.

The fast and high-precision Beckhoff control solution eXtreme Fast Control (XFC) is based on the fast communication network EtherCAT and special I/O modules optimized for XFC that record signals or trigger actions with high accuracy. With I/O response times under 100 µs, XFC enables very fast and extremely deterministic reactions and thus contributes to process optimization. The acquisition of rapidly changing input signals with high temporal resolution makes it possible, for example, to precisely control the injection process in injection molding machines, especially with servo-electric drive technology. Fast value and slope calculation enable precise control value output dependent on switch over event occurrence. This reduces part weight fluctuations and material consumption.

▶ **www.beckhoff.com/ethercat**

The oversampling technology ensures ultra-precise holding pressure switching.
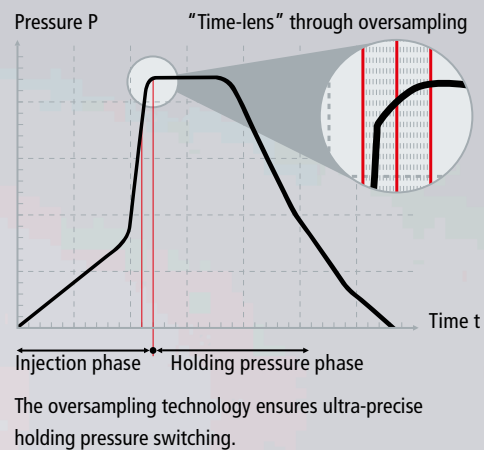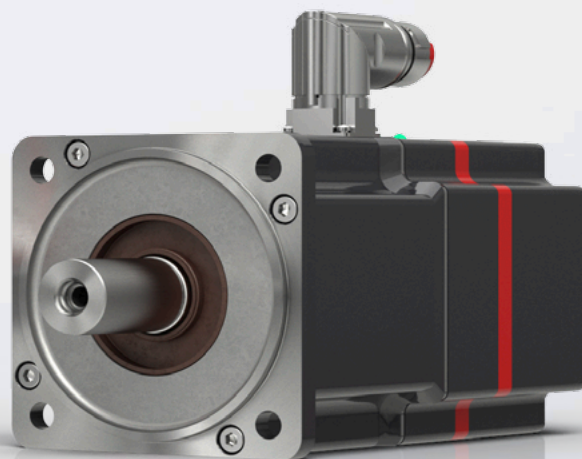
TwinCAT: the integrated engineering and control platform

TwinCAT integrates all engineering and run-time processes on a central software platform. This applies to programming, configuration, real-time environment and all runtime modules. By programming in the common IEC PLC dialects and integrating C/C++ algorithms, machine manufacturers can freely choose the most suitable programming method depending on the qualifications of the programmers, the service strategy and the need to protect expertise. With the integration of MATLAB®/Simulink®, controller concepts are developed based on engineering models, thus contributing to virtual machine development. The TwinCAT interfaces to machine learning algorithms allow the use of AI methods in the traditional control environment. By using Microsoft Visual Studio® as integrated programmer workbench, different version control systems are supported and teamwork is simplified. With the Automation Interface TwinCAT offers open interfaces for the integration of commercial IT systems for automatic machine program generation.

Extensive TwinCAT libraries for motion control save development time thanks to tested and optimized algorithms. The TwinCAT PTP and

TwinCAT Plastic Application Components

Visualization

PLC
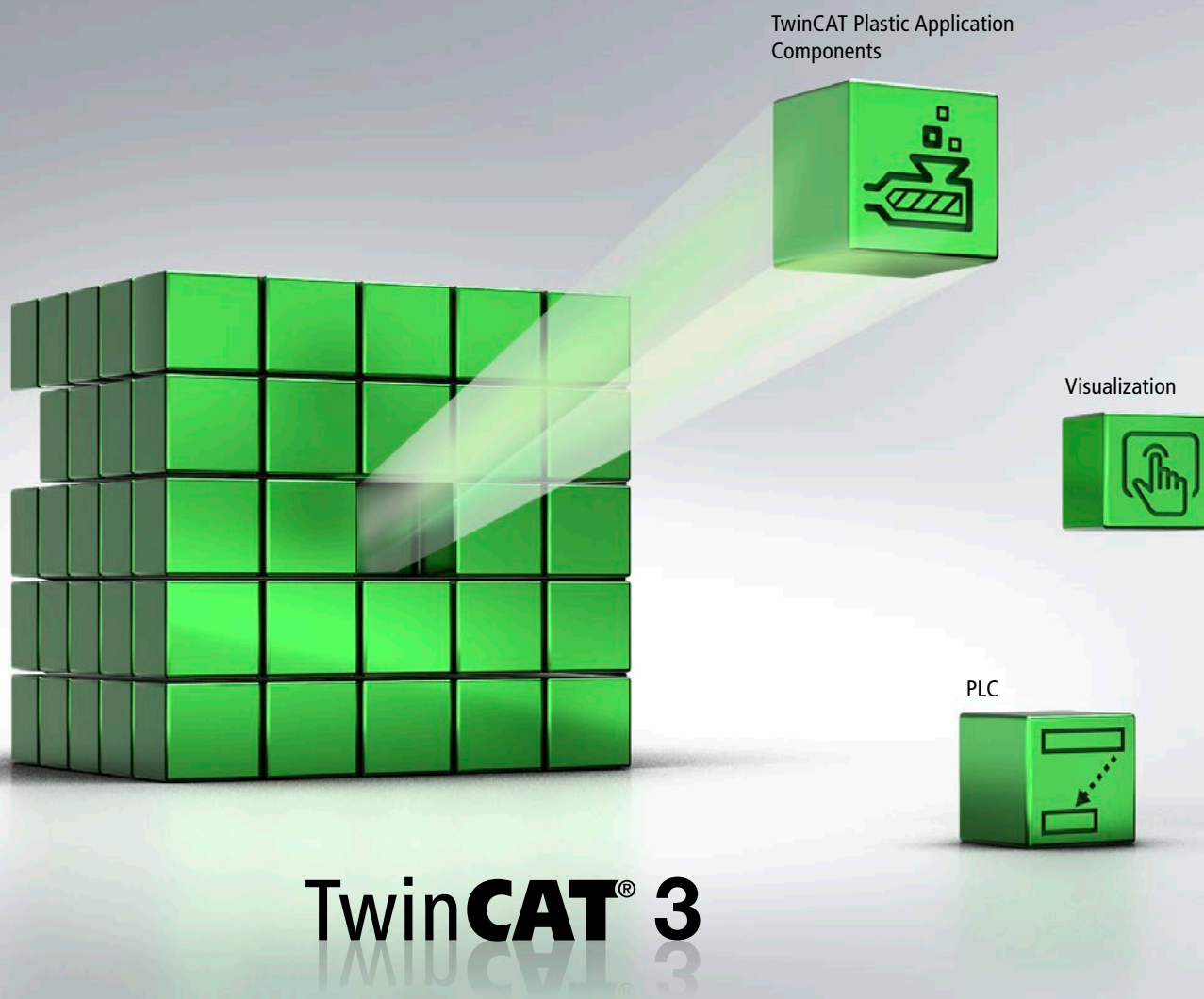
TwinCAT® 3

TwinCAT NC I functions are ideally suited for handling applications with Cartesian robots. Ready-to-run solutions are available with TwinCAT Kinematic Transformation for other robot kinematics, such as SCARA, Delta and articulated robots. Commissioning and service processes are accelerated and improved with TwinCAT Scope, a software oscilloscope fully integrated into the TwinCAT system architecture, and thus contribute to increasing machine quality.

TwinSAFE software-based safety technology simplifies the wiring of complex systems;

variants can be mapped in software. This allows, for example, the modular development and commissioning of production cells. Documentation is also simplified and adaptations to additional customer requirements can be implemented quickly.

The integrated, browser-based TwinCAT HMI visualization solution enables convenient development and maintenance of visualization objects. The information is displayed either on the machines and systems or via the internet using a web browser.

TwinCAT IoT provides the prerequisite for data aggregation in the cloud or locally in the production plant. TwinCAT also includes standardized communication protocols for cloud applications. The collected data can be specifically evaluated using TwinCAT Analytics.

▶ **www.beckhoff.com/twincat**

Robotics for parts removal
and handling

Motion Control for electric
and hydraulic axes

Condition Monitoring for
predective maintenance
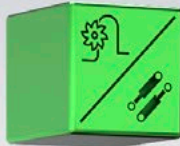
Analytics for machine and
process diagnostics

Scope for controller
optimization

IoT for Euromap
communication

MATLAB®/Simulink® for
virtual machine development

Machine Learning for product
and process optimization

Safety, the universal and
flexible safety solution

XMold: the turnkey solution for injection molding machines

With XMold, Beckhoff has developed a turnkey system solution for controlling complex applications in hydraulic, servo-electric and hybrid injection molding machines. It comprises a CP6212-1001 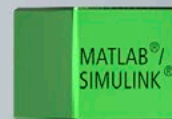Panel PC with a 12-inch display in portrait mode, Beckhoff I/O modules as well as technology software and drive components. The XMold Panel features a key arrangement that is optimized for injection molding process and is designed to suit most applications. The technology software includes standard functionalities, such as switching over to holding pressure, thereby reducing the programming effort for customers.

Using the integrated Ladder Diagram editor, the machine operator can program simple logic networks for the integration of peripheral components. XMold offers fast system reactions and is thus predestined for precision manufacturing. The XMold controller has an OPC UA interface and is thus prepared for all Euromap standards; Euromap 77 and 82 are currently supported.

- Ethernet interface for teleservice via Internet
- host computer connection
- cloud communication
- USB interface for recipe storage

- 12-inch TFT display in portrait mode
- touch function
- LED backlight
- keypad for injection molding applications, 72 membrane key

- language selection
- different user levels
- permanent display of important process data
- flexible I/O programming in Ladder Diagram
- customer-specific look-and-feel through configurable user interface skins

- suitable for all common drive concepts (hydraulic, servo-electric and hybrid)
- supports injection control via central pump or servo valves
- supports toggle and clamping units in the closed control loop
- comprehensive core-pulling functions
- linearization of pumps and valves

- Euromap 77 interface
- Euromap 82 interface
- Euromap 67 interface
- EtherCAT interface

XMold user interface for injection molding machines

To increase user acceptance, the user interface of the XMold solution was implemented on the basis of Microsoft Silverlight Embedded. Thanks to the distinction between the attractive, ergonomic design and programming of the actual operating logic, machine manufacturers are able to customize their user interfaces very quickly and flexibly.

The XMold user interface can be used to control standard applications and complex processes. The XMold controller is especially suitable for servo-electric machines, multi-component machines and high-speed applications. Complex tools with comprehensive core puller functions or servo-driven turning tools are supported. Using the sequence editor, the machine operator can adapt and optimize the machine sequence to the requirements of his parts production. The large screen area with touch function enables clear visualization of the process.
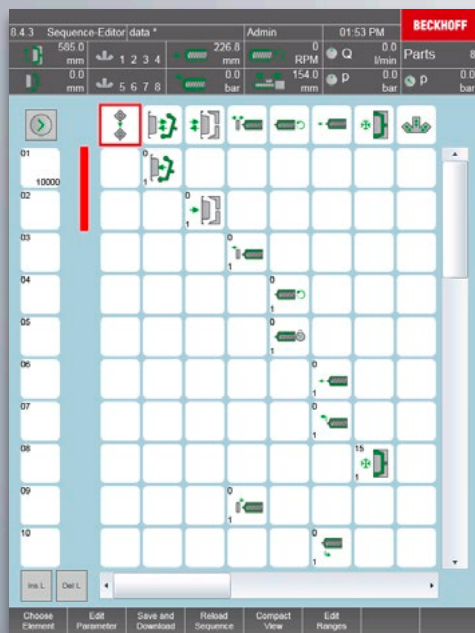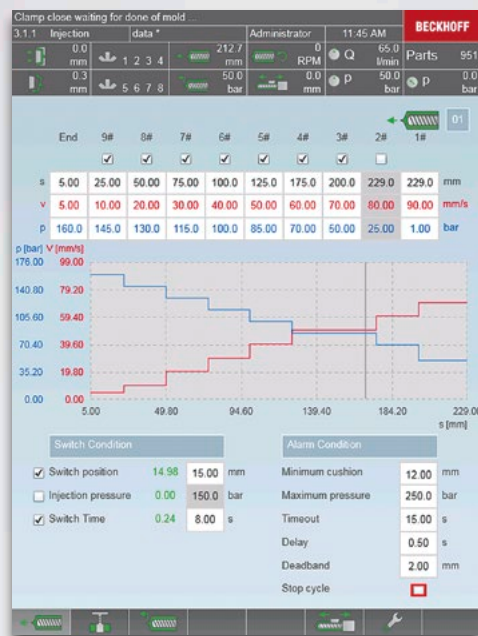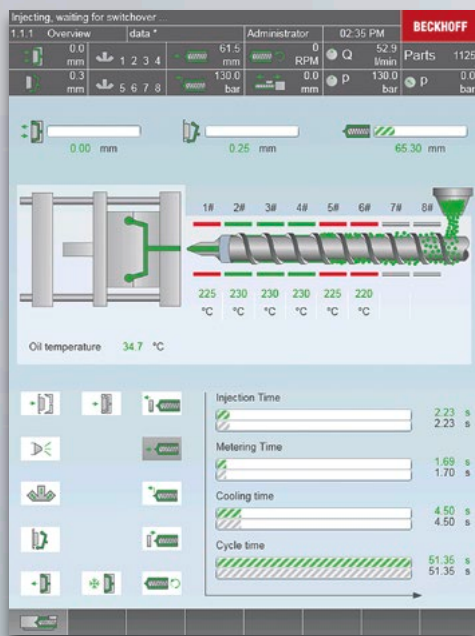
Technology modules for blow molding machines reduce development times

Beckhoff bundles its expertise for blow molding machines, which has been acquired over many years, in technology modules for the implementation of customer-specific or turnkey solutions. The combination of the TwinCAT Plastic Application Components for different drive and machine concepts with blow mold specific HMI objects offers customers a broad basis for creating their own solutions. Alternatively, turnkey solutions are prepared for short-term new developments. In this way, machine manufacturers can implement the entire range of drive technology, including hydraulic, hybrid and electric, with Beckhoff technology.

Key factors for product quality in extrusion blow molding are fast and precise parison control, fast control of the transport movement and the clamping unit as well as the movement of the blow pin. The productivity of the plant is increased through the integration of handling systems. The TwinCAT Plastic Application Components offer the right motion control technology for this purpose.

User interface for blow molding machines

TwinCAT HMI provides users with an innovative and future-proof tool for creating user interface for blow molding machines. Ready-made HMI components, such as the wall thickness editor, can be used directly or modified by the machine manufacturer according to customer specifications. In addition to the presentation on the machine panel, the HTML5-based architecture also enables presentation of machine data on mobile devices, such as smartphones or touchpads, in the same design.

The HMI objects contain numerous functionalities, such as user administration with different access rights or language switching. The main operating page of the extrusion blow molding controller is the wall thickness curve. Thanks to the multi-finger touch function, the blowing curve can be zoomed, analyzed and changed quickly and easily. Interpolation points and curve segments of the wall thickness curve can be represented in an easily recognizable way and defined flexibly by means of colored graduations.
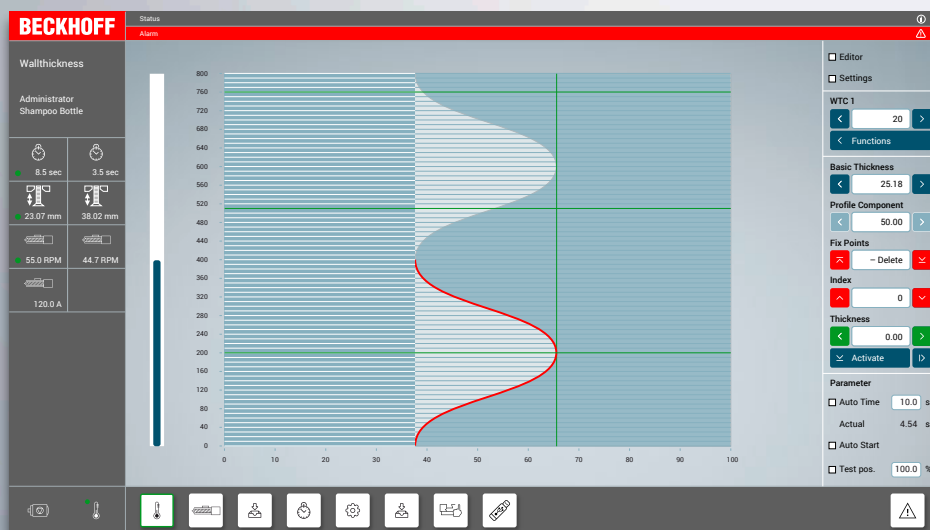
Technology modules for extrusion lines: suitable for any version

The TwinCAT Plastic Application Components contain special temperature controller software function blocks for extrusion processes and drive synchronization functions. The tried and tested algorithms of the TwinCAT temperature controller library are suitable for extrusion barrels and dies with high heat capacity. The optimized PID structure exhibits a dynamic step response with low overshoot. The zoning feature can be used to control the power output such that short-term current peaks are avoided, which significantly improves the energy efficiency. The Beckhoff power measurement terminals are available for documenting the energy consumption and are simply inserted into the terminal segment. For mass throughput control, the Plastic Application Components offer the appropriate interface to separate systems or to an integrated solution that directly accesses the load cells. Other line components are connected either in the traditional way via Euromap 27 or – in future – with the onboard TwinCAT OPC UA supplement via Euromap 84.

User interface for extrusion lines

TwinCAT HMI provides users with an innovative and future-proof tool for creating user interface for extrusion machines. In addition to the presentation on the machine panel, the HTML5-based architecture also enables presentation of machine data on mobile devices, such as smartphones or touchpads, in the same design. The TwinCAT Plastic Application Components for extrusion contain process-specific technology modules and the corresponding HMI objects, for example for temperature control. This allows machine manufacturers to create their own solution or to use a turnkey solution, for example for retrofit projects.

Analysis of the Big Data and secure communication between the machine controller and the cloud takes place via TwinCAT IoT, integrated into the standard controller or via an IoT coupler.
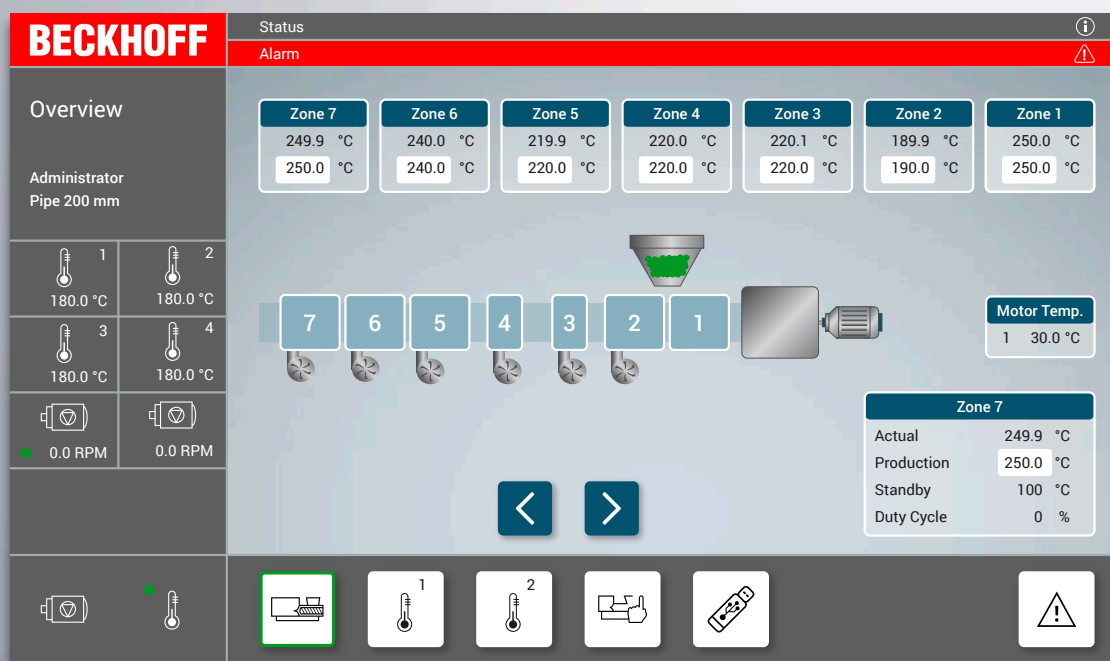
TwinCAT Plastic Application Components: ideally suited for all plastics machines

The TwinCAT Plastic Application Components bundle Beckhoff's many years of plastics expertise in a software library that covers the basic production processes in the plastics industry. The proven Twin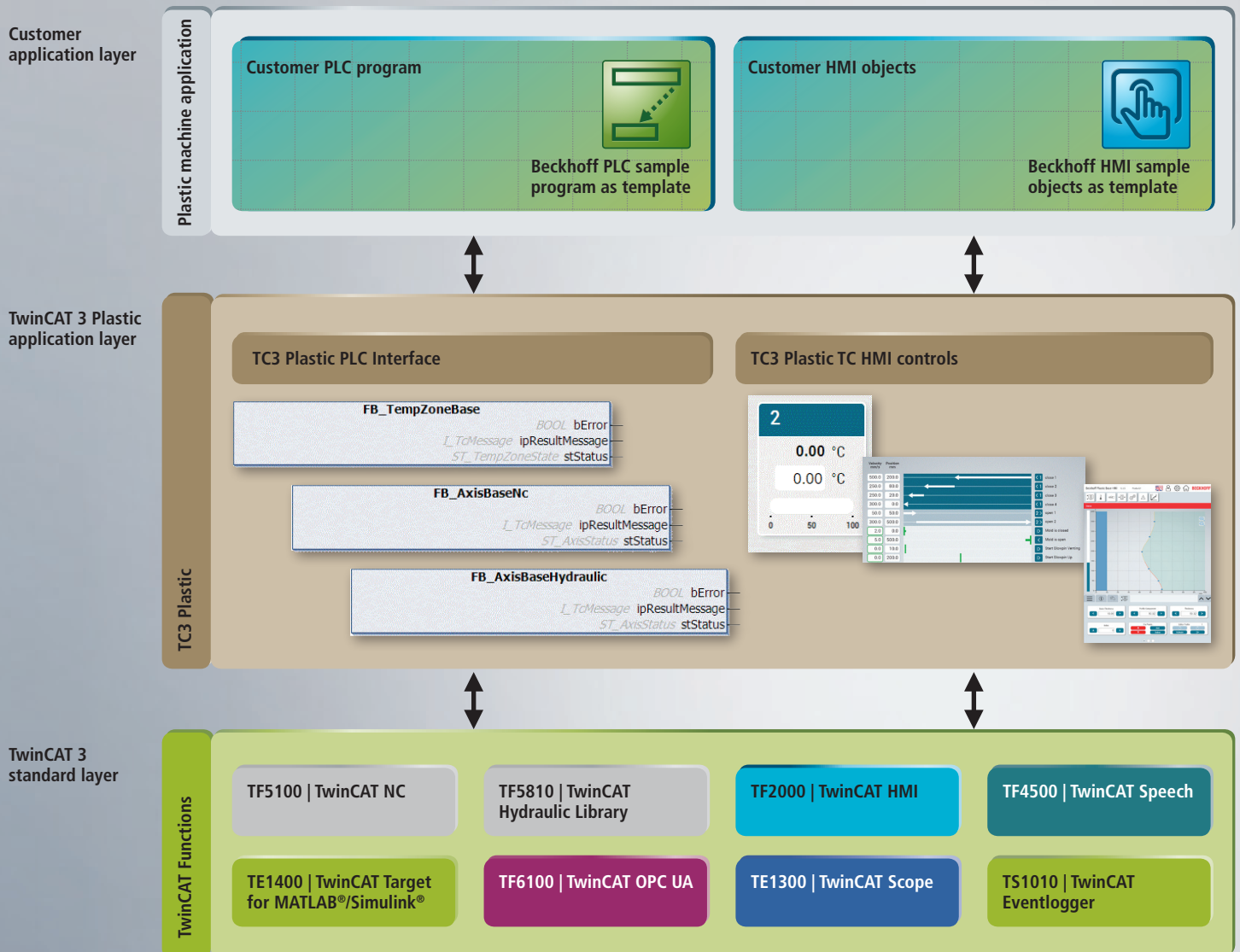CAT Motion Control Supplements are integrated into technology modules for plastics machines. Customers can control and parameterize their machine components, such as the clamping unit, by function block call. With the innovative programming concept of object orientation, development time as well as maintenance and support costs for the control software are reduced. The data flow between PLC and HMI is combined in objects and represents the machine components with their respective properties. The principle of inheritance of object properties facilitates reusability of software modules. In addition, it gives machine builders the opportunity to incorporate their own process expertise and to program their machines individually or rather according to customer-specific requirements.

Customer application layer

Plastic machine application

Customer PLC program

Beckhoff PLC sample program as template

Customer HMI objects

Beckhoff HMI sample objects as template

TwinCAT 3 Plastic application layer

TC3 Plastic

TC3 Plastic PLC Interface

FB_TempZoneBase
BOOL bError
I_TcMessage ipResultMessage
ST_TempZoneState stStatus

FB_AxisBaseNc
BOOL bError
I_TcMessage ipResultMessage
ST_AxisStatus stStatus

FB_AxisBaseHydraulic
BOOL bError
I_TcMessage ipResultMessage
ST_AxisStatus stStatus

TC3 Plastic TC HMI controls

TwinCAT 3 standard layer

TwinCAT Functions

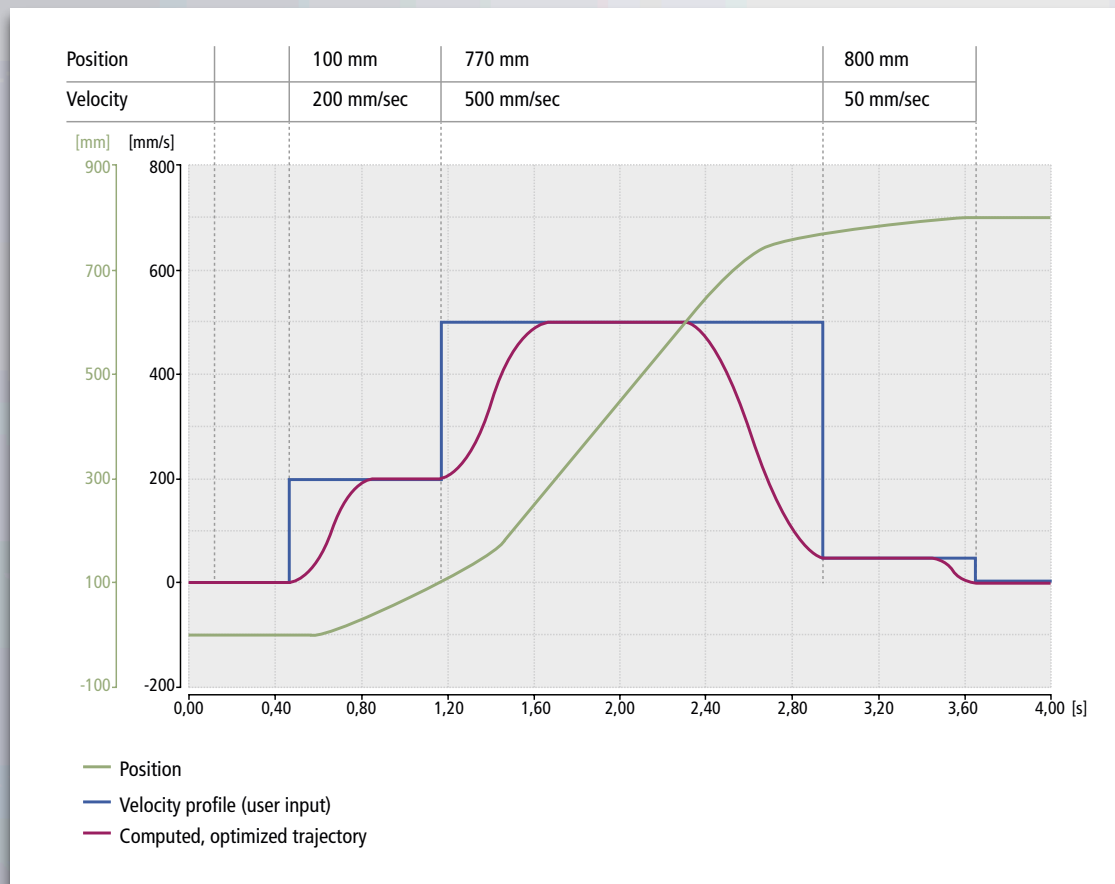| TF5100 | TwinCAT NC	TF5810 | TwinCAT Hydraulic Library	TF2000 | TwinCAT HMI	TF4500 | TwinCAT Speech
TE1400 | TwinCAT Target for MATLAB®/Simulink®	TF6100 | TwinCAT OPC UA	TE1300 | TwinCAT Scope	TS1010 | TwinCAT Eventlogger

TwinCAT Motion Control: ideally suited for hydraulic and electric drive technology

Hydraulic, electric or hybrid drive technology is used in injection molding and blow molding machines. With the TwinCAT technology modules for Motion Control, machine manufacturers gain access to Beckhoff's many years of expertise in all areas of motion control and can develop the various drive types in one engineering environment.

TwinCAT NC can be used to implement electrical drive concepts for plastics machines and robots. In combination with TwinCAT Application Plastic Components, the NC is ideally suited for innovative control concepts for position and pressure control. Set value generators with jerk limitation reduce the mechanical excitation and increase the longevity and accuracy of the machine.

The TwinCAT Hydraulic Positioning software library provides all necessary functions for hydraulic axes. Different hydraulic concepts, such as valve or pump-controlled axes or servo pumps, are supported. Any hydraulic axes can be optimally operated through adapted set value generators, automatic characteristic curve identification, segmented movements and freely programmable switching between force, pressure and position control.

Position		100 mm	770 mm		800 mm
Velocity		200 mm/sec	500 mm/sec		50 mm/sec

— Position
— Velocity profile (user input)
— Computed, optimized trajectory

Example of the calculation of the trajectory for hydraulic drives
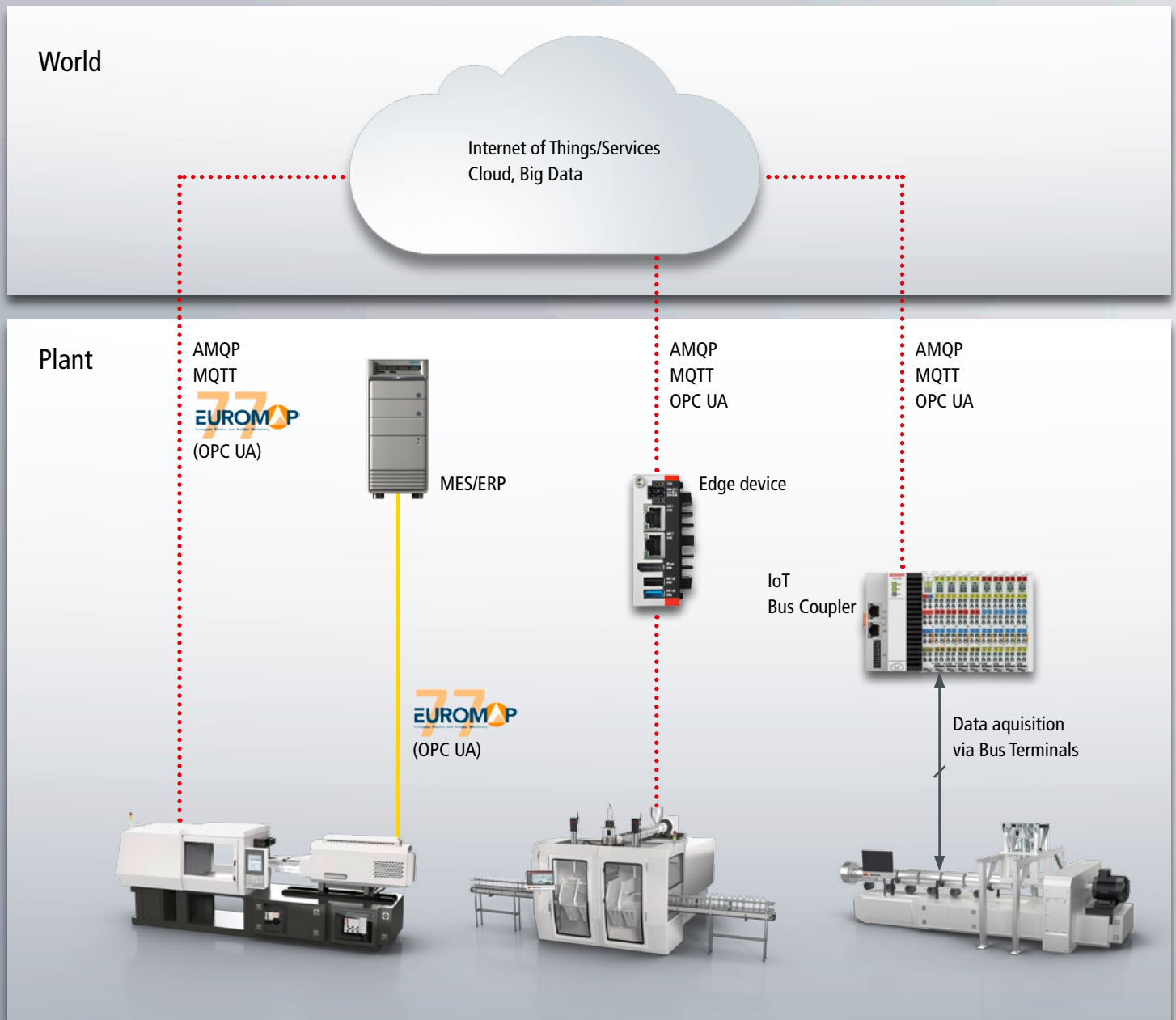The user enters the speed as a function of the position (blue curve). The set value generator processes the speed profile entered, taking into account the dynamic parameters for a trajectory (violet curve). Depending on the drive technology used, TwinCAT Plastic Application Components offer users various set value generators for calculating optimum motion profiles.

Industrie 4.0 applications in the plastics industry

As a major supporter of the OPC UA organization, Beckhoff has integrated OPC UA interfaces as standard into its controllers. Various OPC UA models, as standardized for the plastics industry in the Euromap Companion Specifications, have already been built-in by Beckhoff; new specifications are continually being implemented. The Euromap-77 interface is available for injection molding machines and the Euromap-84 for extrusion systems for communication with master computers and for data transmission into the cloud. Beckhoff has developed the TwinCAT IoT software library for secure communication between the machine controller and cloud-based services. It uses stan-

dardized protocols for the cloud communication and can thus also integrate OPC UA-compatible mechanisms.

Process data are aggregated synchronously with the machine cycle via the TwinCAT Analytics software. Complete data recording provides the basis for valid analyses. As a graphic tool, TwinCAT Scope offers an extensive range of presentation options and thus facilitates the analysis: Plastics processors can use the data representation to analyse and rectify quality problems and reduced productivity due to faulty machine functions. Machine manufacturers can identify and correct

World

Internet of Things/Services
Cloud, Big Data

Plant

AMQP
MQTT
EUROMAP 77
(OPC UA)

MES/ERP

EUROMAP 77
(OPC UA)

AMQP
MQTT
OPC UA

Edge device

AMQP
MQTT
OPC UA

IoT
Bus Coupler

Data aquisition
via Bus Terminals

mechanical problems and software errors. Through the analysis of all the data from a large number of identical types of machine by means of TwinCAT Condition Monitoring, signs of wear in pumps or gears, for example, can be determined at an early stage by establishing a relationship with the occurrence of certain frequency spectrums.

With the Plastic Application Components, typical industry requirements such as the Euromap Companion Specifications or the industry standard Quality Trace can be mapped on the basis of the TwinCAT Supplements.

The TwinCAT HMI provides the user with a location-independent visualization: with an identical user interface he can visualize and analyse the process values that are stored locally on the machine or centrally in the cloud.

However, Beckhoff technology also supports the retrofitting of existing machines and plants. Various hardware and software products are available for this, such as the ultra-compact C6015 Industrial PC with OPC UA interface, which can be retrofitted into an existing control cabinet, thus enabling a cloud connection. Depending on the application this system can also be used as an

edge device for the pre-processing, compression and transmission of data. The IoT Bus Coupler is available for the direct acquisition of digital or analog process values. It is particularly suitable for the retrofitting of machines and enables the uncomplicated transmission of data to higher-level systems via cloud protocol using a preconfigured network access.
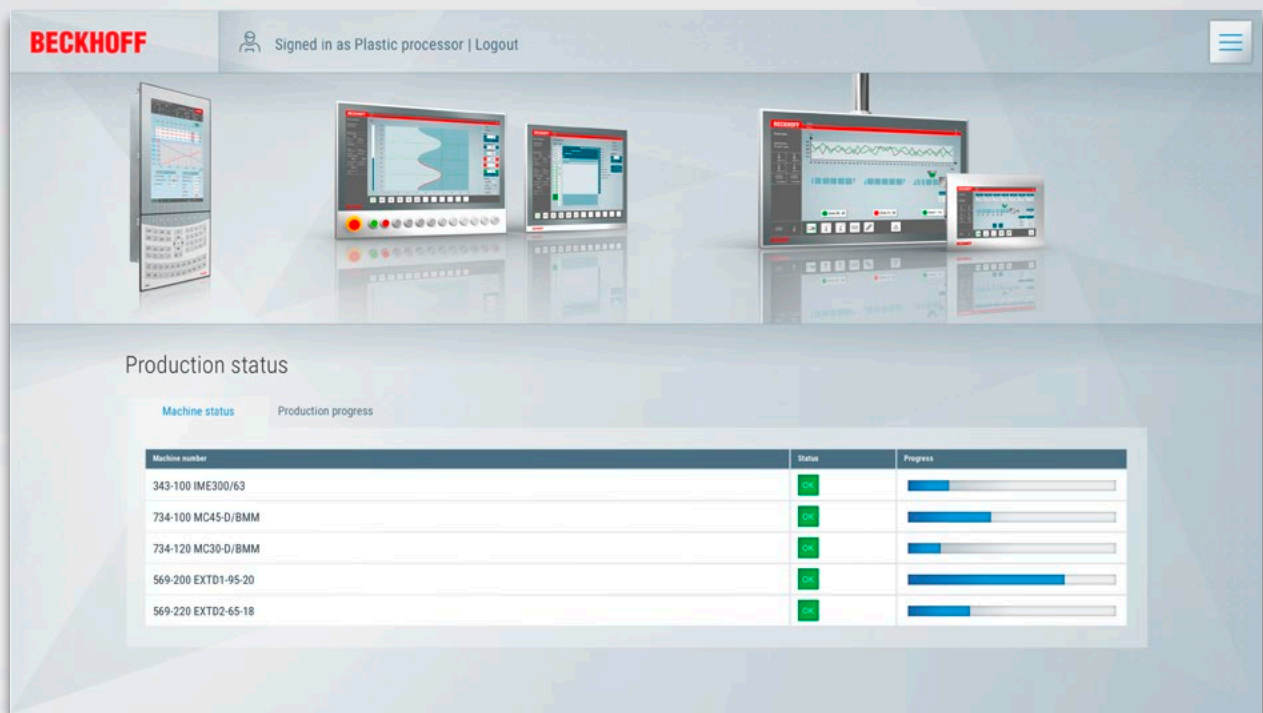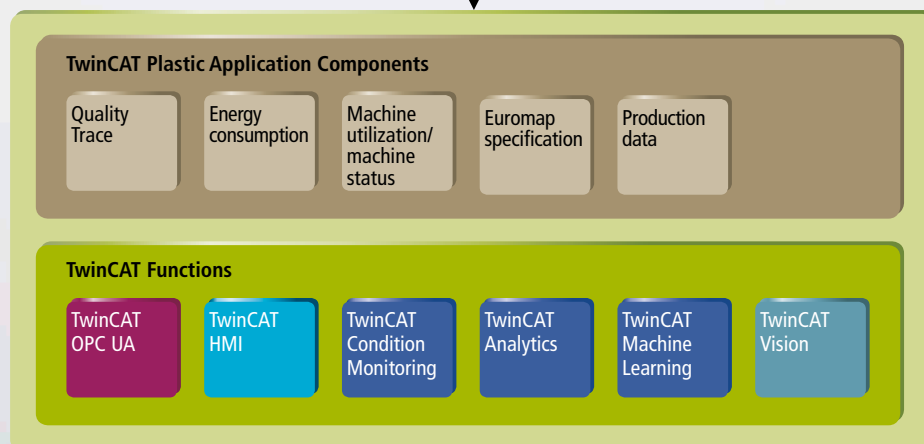
References from the plastics industry

As a specialist in PC-based automation technology, Beckhoff has been supplying innovative, open control solutions to the most diverse branches of industry for over 30 years. The owner-managed company has also established itself as a reliable controller supplier to the plastics industry with a global sales network. The comprehensive range of software and hardware components for the implementation of high-performance solutions is supplemented by the long-standing plastics machinery expertise with which Beckhoff supports its customers in the optimization of their technology.

Husky Injection Molding Systems Ltd., Canada:
High-precision control technology lowers consumption of raw materials in injection molding machines.
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Shuangma Machinery Industry Co. Ltd., China
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Beckhoff worldwide

New Automation Technology

Beckhoff implements open automation systems using PC-based control technology. The product portfolio comprises these main areas: Industrial PCs, I/O and fieldbus components, drive technology and automation software. Product lines are available for all areas and can be used as individual components or as a complete system. The New Automation Technology philosophy from Beckhoff stands for innovative and open control and automation solutions that are used worldwide in a variety of applications ranging from CNC machine tools to intelligent building automation.

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Legend:
- ■ Headquarters
- ■ Distributor
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Beckhoff at a glance

- Headquarters: Verl, Germany
- 2018 sales: € 916 million (+13%)
- Employees worldwide: 4,300
- Offices in Germany: 22
- Subsidiaries/representative offices worldwide: 38
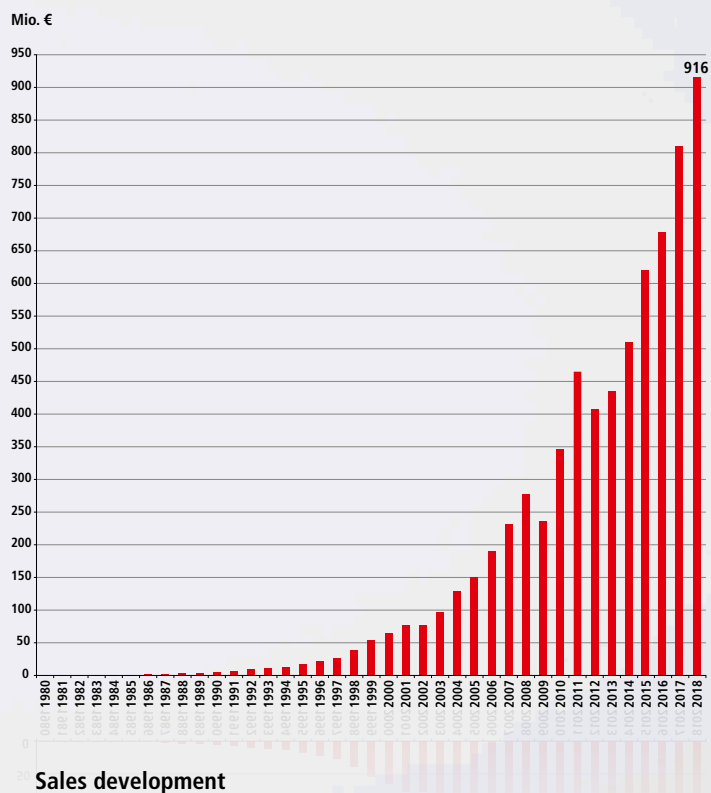- Distributors worldwide: in 75 countries

(As of 04/2019)

Worldwide presence on all continents

With local presence in 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 customers as a prerequisite for a profound understanding of the technical challenges facing customers.

Further information

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