TwinCAT flexibly adapts to diverse industry requirements

"Kinetic Rain" at Changi Airport in Singapore

Entertainment industry

For the entertainment industry, Beckhoff offers a comprehensive automation system, which is suitable to realize almost any artistic idea and everyday task in entertainment engineering: with rapid creativity-to-technology translation it enables users to create the ultimate guest experience in any type of entertainment venue. The heart of this system is TwinCAT, with support for a multitude of specific interfaces such as sACN, QSC, ArtNet, SMPTE-Timecode, AES70, PosiStageNet and PJ-Link. This forms the basis for integrating all technical systems of the entertainment industry on one universal platform. In many of the applications, the proven high performance of TwinCAT, especially with EtherCAT as the fieldbus system, is an important feature for users. In kinetic art applications, such as Kinetic Rain with 1,216 synchronized servo axes, TwinCAT NC is used with up to 255 axes per controller and is therefore the technical foundation for making many projects possible in the first place.

Intelligent lighting control in Beckhoff Bus Terminal production facilities

Building automation

TwinCAT 3 Building Automation (TF8040) is the latest and most comprehensive software package for building automation. It enables system integrators to implement all heating, ventilation and air conditioning (HVAC) projects, as well as room automation. Application templates support the familiarization with and application of TwinCAT in building automation. In the process, the high requirements of modern buildings are met, creating the necessary conditions for safe and energy-efficient operation. TwinCAT HMI Building Automation contains matching controls that are optimally adapted to the templates in the PLC. With TwinCAT 3 BACnet (TF8020), the BACnet protocol is fully integrated in TwinCAT 3 and also supported by the TF8040 PLC library. With the TwinCAT 3 Lighting Solution (TF8050), Beckhoff offers a software extension that can be configured in Excel, making it easy to manage, commission and maintain large lighting systems. It integrates all typical lighting controllers and supports an unlimited number of DALI lines. The solution is fully web- and HTML-enabled and scalable for decentralized operation. Quick function changes, addressing and extensions are possible during ongoing operation, as are DALI-line-independent groupings.

TwinCAT also for packaging processes with XTS

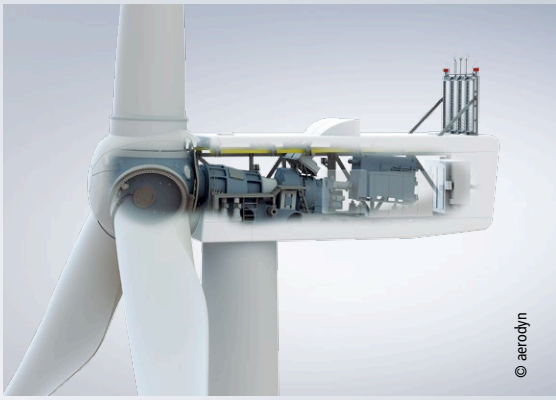
Packaging machines

PC-based control with TwinCAT and EtherCAT as the communication system result in a control solution for highly efficient, flexible and low-waste packaging machines. Ideal for applications where high speed and precision are essential, it enables the optimal synchronization of all process and motion control sequences, accelerating the workflow and minimizing the packaging material consumption. TwinCAT contributes to the stable implementation of all individual process steps with optimally coordinated software interfaces and in-depth industry expertise. The cam plate, register mark detection and modulo functions directly integrated in TwinCAT are predestined for this. Function blocks for HFFS and VFFS are also available as standard. Another advantage is the support of industry-specific requirements according to the OMAC, Weihenstephan standards and PackML, among others. A corresponding team at Beckhoff ensures, for example, that the technologies are compliant with PackML.

PC-based control – and TwinCAT software specifically – represent a universal control technology that is ideal for use in a wide range of applications. However, requirements that are indispensable for specific industries are also covered, e.g. through precisely tailored extensions in TwinCAT Functions. The following industry examples illustrate the wide range of applications for PC-based control and TwinCAT.

Wind turbines

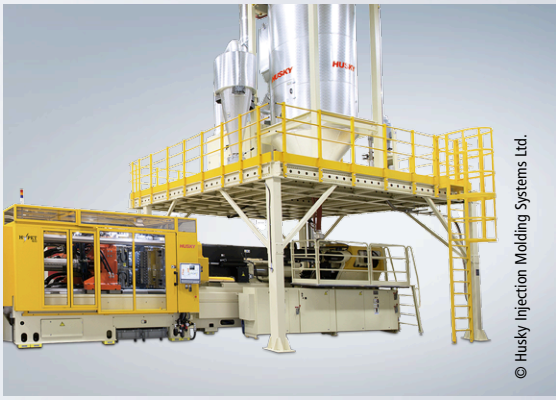
From the numerous application developments for wind turbines, a comprehensive software base has evolved at Beckhoff, from which the TwinCAT 3 Wind Framework (TF8310) emerged. It provides industry-specific knowledge in the form of modules, libraries and an application template. The framework is optimally adapted to the modular hardware design of modern wind turbines and supports development, programming and operation as well as comprehensive data management. Thus, the modules can be used for all basic software functions, e.g. to detect and react to system events and malfunctions and to control and regulate subsystems such as pitch and converters. The system can be operated on-site or remotely, but all information is evaluated and recorded during permanent and unattended operation to enable subsequent analysis. For this, the framework integrates direct connection to an SQL database and communication via IoT protocols.



Modular aeroMaster technology with the TwinCAT 3 Wind Framework

Plastics machines

In the plastics industry, TwinCAT is used in various application scenarios, both as a general engineering platform and as the basis for the specific Beckhoff technology software to control plastics processing machines. TwinCAT perfectly controls and optimizes real-time processes, such as the rapid switchover of holding pressure. TwinCAT combined with high-performance EtherCAT communication enables ultra-fast signal processing while monitoring the pressure curve during injection processes. Non-linear gear functions such as toggle levers or knee levers are frequently used in plastics machines. In addition to precise motion control, this also requires the alternating control of pressures. The technology software for plastics machines supports these mechatronic systems on the basis of TwinCAT NC or the TwinCAT Hydraulics Library (TF5810). Furthermore, there is a special temperature controller optimized for sluggish control systems such as extruder cylinders. Industry-specific Industrie 4.0 applications are realized according to the OPC UA-based Euromap standards. TwinCAT OPC UA (TF6100) establishes the platform for implementing these Companion Specifications.



High-precision control technology reduces raw material consumption in plastic injection molding

Process industry

Along with developing suitable EtherCAT Terminals for the process industry, TwinCAT has also been expanded accordingly. The HART communication protocol is widely used in the process industry for bidirectional data exchange with field devices and also for their configuration and parameterization based on the FDT/DTM concept. TwinCAT has been enhanced in such a way that the DTMs can be integrated into the engineering process without the need for additional software. The use of Module Type Packages (MTP) is a modern approach to modularize automation systems and increase the flexibility of production systems. It contains a vendor-neutral, functional description for the automation of process modules that are integrated into higher-level process control systems. TwinCAT MTP (TF8400/TF8401) implements this concept and, through an engineering extension, offers the possibility for efficient module development and subsequent export of the MTP. The engineering already provides a large part of the control code through automatic code generation, which is based on an MTP-specific PLC library.

TwinCAT MTP for modularization of process equipment

More information:
www.beckhoff.com/industries