

TwinCAT supports a wide range of functions in engineering and runtime applications

TwinCAT is a comprehensive automation software suite with matching components for use in many different application areas. On the one hand, these include the engineering products for configuring and programming an application. On the other hand, the so-called runtime products are available, the basis of which is the real-time environment for a variety of operating systems.

The tasks which ensure that the inputs and outputs of the various fieldbuses are queried and set are made available within the runtime environment. If required, a PLC can be added, which is programmed in the standard IEC 61131-3 languages. Furthermore, several PLCs can be used simultaneously in a TwinCAT system on one PC – and have several tasks that can also be executed on different cores of the Industrial PC. In this way, the performance and bandwidth of the computer can be utilized in the best possible way.

Motion control with numerous axes is supported for simple point-to-point movements and also for cam plates or couplings. Interpolating movements can be implemented with TwinCAT NC I and TwinCAT CNC (see p. 28). In addition, robots can easily be moved with corresponding kinematic transformations in TwinCAT (see p. 27).

Integration in programming and functionality

Programming in the IEC 61131-3 languages – i.e. conventional PLC programming – is used by the majority of TwinCAT users (see p. 24). If required, the high-level languages C or C++ as well as MATLAB® and Simulink® from MathWorks® can also be used and integrated seamlessly, which means that programs created with these languages can be executed in the TwinCAT real-time environment. In the area of machine safety, TwinCAT Safety Logic is available to users. This means that safe applications can

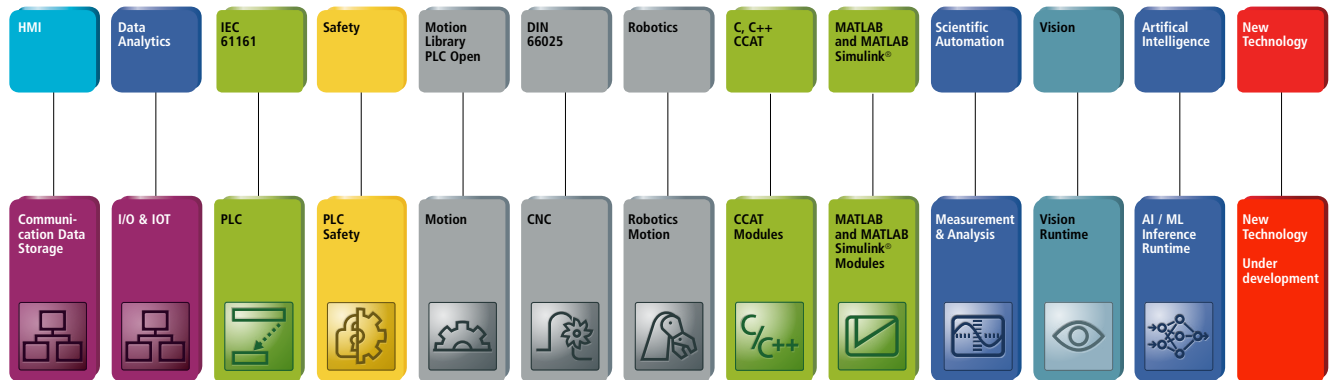


be developed in the required language – Safety C – and safely executed in TwinCAT real-time.

The engineering toolbox, which extends the basic TwinCAT Engineering, includes TwinCAT Scope with many options for the graphical representation of analog and digital signals. Additionally, it includes diagnostic tools such as the ADS Monitor and the Realtime Monitor. TwinCAT HMI features a powerful engineering environment that is integrated into Visual Studio®. Here visualizations can be created and tested in a simple, graphical manner. Once the visualization is ready, it is transferred to a target device with an HMI server, executed by it and displayed using any web browser.

Numerous TwinCAT measurement technology products enable the machine builder or system integrator to capture and analyze measured values. TwinCAT Analytics (see p. 34), for instance, enables easy graphical configuration. TwinCAT Analytics is usually run on a server or even a virtual machine in the cloud. On the other hand, TwinCAT Condition Monitoring is typically an application that is permanently executed on a target device. In the broadest sense, measurement technology also includes the TwinCAT products in the area of machine learning (see p. 38). This relatively new technology can be used to analyze measured values or optimize machine processes automatically.

Tools



Runtime

TwinCAT is a modular automation software suite that seamlessly combines standard control functions with additional functionalities such as robotics, machine vision and artificial intelligence.

Control modules are available in the TwinCAT Controller Toolbox. The temperature controller can be used for special control processes.

Movements can be configured, parameterized, programmed and also commissioned using TwinCAT Motion Control. In addition to simple A-to-B motion, TwinCAT PTP can also be used to implement cam plate and gear coupling functions. TwinCAT NC I is used to control interpolating movements of up to three axes, e.g. in laser cutters. The TwinCAT CNC package with many functional extensions is perfect for all kinds of machine tools.

Communication standards are supported

Machines and systems often need to exchange data with other machines or with MES/ERP systems. Various communication systems and protocols are available for this purpose. TwinCAT OPC UA (see p. 55) is certainly the most widely used protocol for machine connectivity in this context. To connect wind turbines, for example, support for industry-specific telecontrol protocols is required – and also available with TwinCAT software products.

The integration of machine vision and industrial image processing in TwinCAT is relatively new. TwinCAT Vision (see p. 36) can be used to configure and commission cameras in TwinCAT Engineering. The images are then sent from the camera to the IPC in the GigE Vision communication standard and

processed directly in the PLC. For this purpose, approximately 600 algorithms are available in a PLC library, which enables machine vision programming in common PLC programming languages.

In addition to all these solutions, other special products and functions are available for specific industries. This applies, for example, to industries such as wind energy, plastics, entertainment, packaging, processing and building automation (see p. 56).

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