

Wind turbine manufacturer Zhejiang Windey relies on Beckhoff technology

# TwinCAT "Wind Library" reduces engineering expenditure for 1.5 MW wind turbine

The 1.5 MW wind turbine from Zhejiang Windey has a classic design: a three-blade up-wind rotor with horizontal main shaft and three-point bearing. The drive train consists of a three-stage planetary gear and a double-fed induction generator. As an actuator for power or speed control, the plant has an independent pitch system that also encompasses the servo drives for the blade adjustment. The plant is characterized by reliable and stable operation, high efficiency, good grid compatibility and a robust design for use under extreme environmental conditions. The automation of the plant is based on a CX1020 Embedded PC with inline-connected EtherCAT I/O terminals as well as TwinCAT automation software including the TwinCAT "wind libraries".





The automation platform of the 1.5 MW wind turbine from Zhejiang Windey consists of a CX1020 Embedded PC with inline-connected EtherCAT I/O terminals and the TwinCAT automation software, including the TwinCAT "wind libraries".

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Zhejiang Windey Wind Power Engineering Co., based in Hangzhou, China, was established in 2001. The business areas of the company, which evolved from the Wind Power Research Sub-Institute for Zhejiang Institute of Mechanical & Electrical Engineering, include the development and production of wind turbines, their connection to the grid and the operation and maintenance of wind farms. The company additionally offers engineering services for the planning and construction of wind farms.

#### **TwinCAT: the complete and open control solution for wind turbines**

In the TwinCAT "wind library" Zhejiang Windey has found the ideal basic construction kit for the engineering of its wind turbines, as Lou Yaolin of Zhejiang Windey stresses: "The 'wind library' provides a clear program structure and contains a complete set of function blocks enabling us to design the automation program flexibly." The entire library is available in open source code, so that the user can make any desired or required adaptations and extensions autonomously.

#### **System management and diagnosis in one tool**

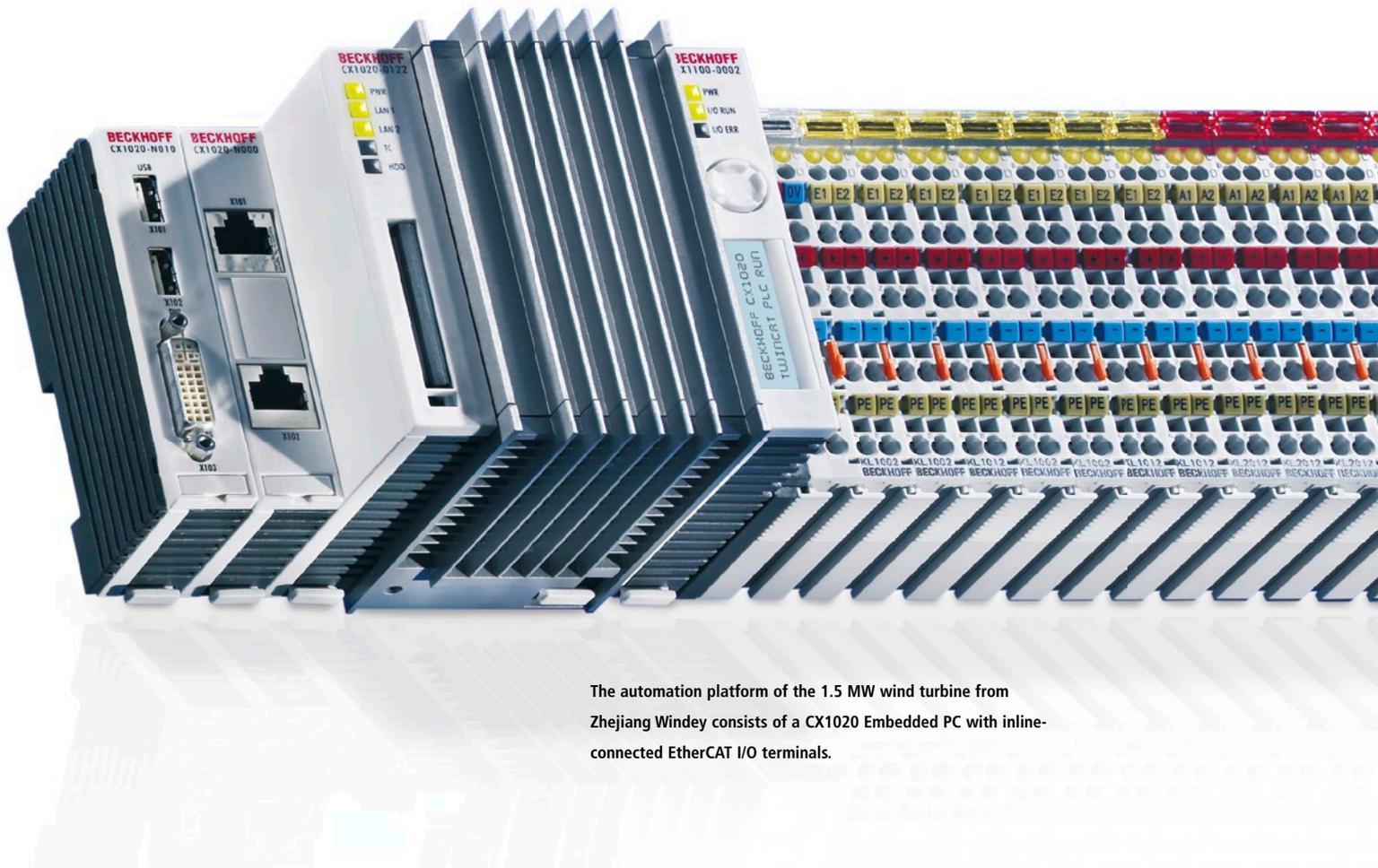
The "wind library" offers numerous management and diagnostic

functions for wind turbines resp. for process monitoring and control. As a result the engineering time and costs are substantially reduced and the user can fully concentrate on the plant-specific part of the wind turbine automation tasks.

The "wind library" also provides various functions for the logging of process data and events. The user can easily adapt the type and extent of the data to be saved as well as time intervals, file names and storage paths of the files to be written (e.g. on Flash disk or hard disk). The library also contains general function blocks, for example for reading the CPU utilization rate of the controller or for the diagnosis of the EtherCAT I/O modules. These diagnostic blocks can be called up as needed and the status information can be used to form status codes, so that a smooth and reliable wind turbine operation is ensured.

#### **Tools for code generation**

In addition to the blocks available in the source code, the TwinCAT wind library encompasses tools for the automatic code generation. With the help of these tools the I/O signals, parameters, status codes and telecontrol commands with all their individual characteristics required for the plant operation can be conveniently created and



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maintained. With these tools the data entered can be stored both as an Excel file and in a format that can be directly imported by the TwinCAT programming tool (\*.exp format). In this way not only is the programming speed increased and the occurrence of code errors reduced, but also the operation and maintenance of the wind turbine are made considerably more convenient.

#### Access management and Scada interfaces

Blocks for the management of user access are also part of the scope of delivery of the "wind library". They allow a fine graduation of the access rights for all users: a total of 100 access levels are available, where zero is the lowest level and one hundred the highest. If a user has logged in at his individual level, only the functions and information enabled are available to him. The user name and password are transmitted in encrypted form for logging in. The blocks for encryption and decryption are part of the library.

Beyond that the "wind library" also provides a visualization interface on the PLC side that makes do without any special communication interface. All process data and telecontrol commands enabled for remote access can be read or operated by external Scada systems via this interface (taking into account the access level).

Other communication protocols such as Modbus, TCP/IP or OPC can also be enabled for access. Zhejiang Windey uses Modbus TCP and a Scada remote system for data interaction.

#### Outlook

After the first 1.5 MW wind turbine equipped with TwinCAT was put into operation in the Zhangbei wind farm and is running stably and reliably, Zhejiang Windey is planning to use the "wind library" on a large scale for the control of its wind turbines by the end of 2013.

Further information:

[www.chinawindey.com](http://www.chinawindey.com)

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