CAN Newsletter Online

CONTROL PLATFORM

Building a wind energy control system

With Advantech's Apax-5000 series, AMC offers a system for the generation of measurement and control systems. It has been employed in wind energy systems that communicate via CANopen.

The Apax-5000 control platform has been employed in wind energy control systems (Photo: AMC)

Distributed energy resource systems are small-scale power generation technologies (typically in the range of 3 kW to 10 000 kW) used to provide an alternative to or an enhancement of traditional electric power systems. Wind energy is one of the major power sources for these systems, especially for standalone power generators within a smart grid system. One of Taiwan's smart grid projects is working to integrate wind energy systems to develop a complete system. They turned to Advantech for a solution which could deliver pitch control, hydraulic system monitoring, and wind turbine control.

To provide easy maintenance and accessibility through the web, the client needed a dedicated HMI device able to manipulate the wind control system from the tower base and provide real-time monitoring capabilities. Furthermore, the integrator required a compact PAC controller that could receive analog wind speed and direction signals from an anemometer to direct the nacelle and rotor blade in order to catch the optimal wind direction. They also wanted to program a pitch control algorithm using Soft Logic to slow the blades from moving too fast in the event of high winds or abnormal vibrations from the wind tower. Furthermore, the relative devices used in such an application utilize CANopen as the usual communication protocol, so compatibility was important.

Apax-5521KW combined with Apax I/O modules were integrated into the wind control system to provide optimum control. As a PAC controller with embedded KW Soft Logic, Apax-5620KW provides real-time deterministic execution of complicated pitch control application. Furthermore, it takes advantage of one CANopen interface and one LAN port to offer communication ability with other devices. The Apax-5080PEC high-speed counter module provides accurately encoded A/B/Z signals from wind yaw and rotor blades. Through APAX-5060, 12-channel relay output can be connected to the hydraulic system to control the yaw and rotor blades.

The Apex-5000 is a control platform with an open development architecture, in which control, data processing, and networking are combined in a single control system. It has been specially designed to meet the requirements of Industry 4.0. The platform consists of a PLC or PAC controller, bus couplers, and I/O modules for the connection of analog sensor technology and digital signals for the acquisition of status messages and switching of actuators at the control systems. In addition to the network integration of the controller, communication via WLAN or 3G is also available for remote access and data transmission into higher-level monitoring and process control systems.

The series includes I/O modules for analog and digital signal acquisition. Up to 32 modules can be connected to a system, which are connected either directly or by Ethernet cable via the Apax Local Bus. The PLC controllers of the Apax series use the IEC 61131-3 programming languages of Codesys or Microsoft .NET software to create the control application.

Furthermore, power supplies and the iDoor fieldbus modules are available for further connections to CANopen, Profibus, Profinet, Ethercat, Ethernet IP, and I/O modules. Another possibility is the integration of a hard disk for data recording and serial COM port expansion modules for the individual assembly as master and head station of the automation system. With the help of couplers of the series, a decentralized, flexible, and distributed remote I/O system can be extended or added to existing PLC systems.

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