FACTS & FIGURES

Lifting 40000 t and more

(Source: Mammoet)

Hycom, a Hydac daughter company, provides hydraulic systems. With the precision of millimeters, multiple hydraulic cylinders are controlled via CANopen. The Dutch company, established in 1974 and 2013 integrated into the Hydac Group, has developed for Mammoet the CANopen-based control system for the shown Mega Jack 5200 hydraulic lift system. The system is used to lift structures weighing over 40000 ton. It can lift more than 40 hydraulic cylinders with a tolerance of half a millimeter. The previous system consisted of a jack with four cylinders and was realized by two dual-axis controllers. If several jack towers were needed, system complexity increased enormously. For the current system Hycom developed a new control concept in less than three months. The company has already made positive experiences with Bachmann, an Austrian company. Hydac and Bachmann are CiA members.

Each tower uses a controller from Bachmann controlling the hydraulic cylinder and the associated diesel engine. Every tower is networked to the central host controller, allowing to move synchronized 40 cylinders and more. An MX207 processor, a PVA208 proportional valve amplifier, an AIO216 analog I/O module, and a DIO232 digital I/O module are applied for each sub-controller. The sub-systems communicate via CANopen with the CM202 host controller. By means of the Scada web interface, the user gets information about each individual cylinder including the exact status of the hydraulic valves. There is also a scope function, which helps to commissioning the jack towers and to troubleshoot them, if necessary. Every channel can be examined in details and analyze the results in Matlab Simulink. *hz*

Protecting 70-m blades

(Source: CRRC Shangdong)

CRRC Shangdong Wind Power (China) relies on the blade-load measurement system from CiA member Bachmann. In order to avoid damaging of rotor blades, the Austrian company has developed the CLS300 cantilever sensors. Two sensors are installed near the hub of each of the three blades and cabled to the control cabinet, where the signals are fed to the GIO212 module. The blade-load values are transmitted from the sensors to the wind turbine main controller via a CANopen network. The host controller evaluates in real-time the measurements with the manufacturer's design values. In case the limits are exceeded, the blade load is reduced by repositioning the rotor blades in relation to the wind (pitch control).

Unlike optical sensors, CLS300 sensors can be re-attached, which leads to lower follow-up costs. They are supplied pre-assembled on a mounting rail. The sensor unit, consisting of a cantilever clamped on one side and a proximity sensor on the opposite side, enables the conversion of a strain measurement into a distance measurement. Due to the inductive displacement measurement, the sensor is not subject to mechanical deformation. This guarantees a long-term stability. *hz*

4 CAN interfaces

(Source: Bucher Municipal)

The Flexline 310 sewer cleaning vehicle by Bucher Municipal is based on a CR711S host controller by ifm, coming with four CAN ports. This control unit embeds two independent PLCs (programable logic controllers) and is suitable for safety-related control applications compliant with ISO 13849 (PL d) and IEC 62061 (SIL CL 2). The CAN interfaces can run CANopen Safety, CANopen, or J1939 protocol stacks. The embedded PLCs implement Codesys 3.5.

The vehicles also use the CR0451 display by ifm indicating the operator the necessary parameters. Via CANopen several CR2032 I/O modules are connected to the PLC. The 16 ports can be configured to provide different functionality, for example digital inputs or outputs for controlling proportional valves. The pre-filtering of data not only reduces the CANopen busload, but also simplifies the PLC programming. *hz*