CANopen in rail vehicles

Innotrans gag

At the Innotrans 2012, the company will present in the hall 6.2, stand 123, the driver simulation software "Locsim". The visitors may test the software steering a simulated rail vehicle in a demonstrated operators stand.

Selectron (Switzerland) has supplied its TCMS system (Train Control and Monitoring System) for integration in the locomotives from CSR Quishuyan (QSY), which is one of the market-leading locomotive manufacturers in China. QSY will implement the system with support from Selectron China and Switzerland. The vehicles will be shipped to company's customer Pacific National (PN) in Australia, which is planned for 2012. The AC-powered vehicles will be used for coal transportation in Queensland's mining industry. Four locomotives are grouped as two sets in order to pull up to 120 rail cars. This results in train lengths of up to 3 km.

The TCMS system is based on CANopen and Ethernet. It is a platform for generic train automation applications designed for harsh environments. Regarding shock, vibration, temperature, EMC, system's modules are in accordance to the rail standard EN 50155. The whole system can be designed and programmed with the Symphony tool family, which was recently updated by the company (also in regard to

Figure 1: Chinese locomotives from CSR Quishuyan

CAN/CANopen functions). The tool, based on IEC 61131, allows configuration, communication, diagnostic and system management. For HMI configuration while the development phase, the Maestro Designer tool is used.

The Swiss company also supported the refurbishment of a guard's van Bcm61 from Ralpin (Switzerland). The latter operates a rolling autobahn (Rola) through the Swiss Alps. In the Rola terminals, complete trucks are laden on the train. The truck drivers travel in the guard's van. Daily, up to 22 Rola trains run between Freiburg (Germany) and Novara (Italy). Two Rola trains operate between Basel and Lugano (Swiss). Some of the trains are equipped with the Bcm61 guard's van, which was modernized in 2011. The van with up to 48 sleeping berths is air-conditioned. Selectron supplied the electronic control devices interconnected via CAN, EIA-485 and Ethernet. The central control of the van's electronics is done with the CPU 831-TG. The CPU 727-T controls the air-conditioning. Further controller and expansion modules were also deployed.

The train standard (EN 50155, Railway applications – Electronic equip-

ment used on rolling stock) has been launched in 1996. CAN is able to fulfill this standard regarding EMC, shock, vibration, temperature and long-term availability. The IEC 61375-3-3 standard (Electronic railway equipment – Train Communication System (TCN) – Part 3-3: CANopen Consist Network) was released in April 2012. Thus, CANopen became an internationally accepted network in rail vehicles.

Today CAN and CANopen solutions are already running on several thousand trains worldwide in applications on new trains, refurbishment projects, sub-systems and in infrastructure. Different types of trains such as locomotives, coaches, urban/regional trains, track maintenance machines, high-speed trains, trams, monorails, metros are running with CAN/CANopen systems. A number of sub-system suppliers e.g. for propulsion, air-conditioning, brake, door, lavatory and light have designed CANopen as a standard interface on their devices. The success of CAN/CANopen on trains is based on its robustness, open structure, flexibility, long-term availability as well as a large number of available CAN-controllers. ◄

Figure 2: Guard's van Bcm61 from Ralpin