

Radio-controlled loading and unloading of freight trains

Control upgrade ensures increased functionality and reduced costs

Moving large and heavy loads can, of course, be quite expensive. This applies in particular to tandem crane lifting with complex movements. The US-based Control Chief Corporation has been supplying industrial, wireless control solutions for locomotives and material conveying applications for almost 40 years. In the steel, coal and grain industries Control Chief systems support the handling of large material quantities in different environments, including marshalling yards and ship loading. The application of radio remote control enables the positioning of operating staff in safe locations and optimizes the efficiency of the operations.

In April 2010 Control Chief used the newly developed Triad module as a remote control system for locomotives for the first time.



Control Chief Corporation, based in Bradford, Pennsylvania, USA, provides standard and customized solutions for controlling cranes and locomotives that are exactly tailored to customer requirements. "Costs are a key factor for our competitiveness in the market, so that our solutions can affordably cover a whole range of applications," said Brian Landries, V.P. of Sales and Marketing at Control Chief.

PC-based Control replaces traditional PLC

"The vendor of the PLC that Control Chief used discontinued the line, so our future product development strategy needed to be reconsidered," said David Persichini, Product Manager at Control Chief. "In addition to cost optimization, our aim was to extend the technological capabilities of our control units." To-

fieldbus, which used to be the case with our old PLC system." Control Chief integrated the EtherCAT protocol directly into the wireless Triad controller via an HMS Anybus module. Jake Bryner explains: "Via the EL6001 serial interface and the EL6752 DeviceNet master terminal Control Chief is able to use different fieldbuses in a flexible manner."

All functions combined in a single programming platform

On the software side Control Chief utilizes the flexibility of the IEC 61131-3-compliant TwinCAT programming environment. "The possibility to choose between different programming languages within the same software is very convenient," said Jake Bryner. "In the past, all functions of the wireless controllers – starting from the I/O control right up to the HMI and several external communication



The wireless communication enables Control Chief's whole range of wireless control units to be connected. EtherCAT facilitates connection to a wide range of devices and industrial networks.

The Triad control platform consists of a CX1010 DIN rail-mountable Embedded PC from Beckhoff, directly-connected EtherCAT I/Os, the TwinCAT PLC automation software platform and a CP6907 Control Panel with 5.7-inch monitor.

wards the end of 2008 we started developing our "Triad" control unit, with the aim of replacing the predecessor modules. It combines wireless communication, fieldbus networks and safety functionality.

In April 2010 Control Chief used the Triad module for the first time for remote control of a locomotive in a coal mine: The task was to transport the coal from the mine over 17 miles (27 km) to barges for shipping. "The central control system of the Triad module consists of a CX1010 Embedded PC from Beckhoff with the TwinCAT PLC automation software and EtherCAT I/Os. This provides an amazingly flexible and powerful control solution," said Jake Bryner, Technical Director at Control Chief. A Beckhoff CP6907 Control Panel with 5.7-inch monitor and DVI/USB extended interface is used as operator interface.

Data transfer from the Triad unit to the portable operator control unit (OCU) takes place via a radio module. Triad transfers the confirmed commands to the CX1010 and feeds the relay state data back to the OCU. TwinCAT processes the control commands of the OCU in conjunction with the locomotive data and guarantees safe control of the locomotive movements and safe loading and unloading of the coal. "The audio interface of CX1010 offers a functional expansion that enables us to issue voice warnings and alarm messages to the operator," said Jake Bryner.

Communication with optimum flexibility

"The use of EtherCAT gives Triad unique flexibility," said Jake Bryner. "Even though the EtherCAT network represents the most efficient integration with the Embedded PCs, our customers can choose between different fieldbuses and integrate them into their modular devices, instead of being limited to a single

options – were developed in different software packages and had to be linked with suitable drivers. TwinCAT PLC HMI CE now enables us to integrate the visualization. The option to combine all functions in a single programming platform is a big advantage," said Jake Bryner. "In addition, customization of the HMI, including diagnostic tools, troubleshooting, system setup and configuration, are now much easier. Optionally, we can set up the control system via the Control Panel or via mechanical switches in the Triad controller."

Improved performance, lower system costs, reduced development time

The new control platform was implemented very quickly: "It only took around six months from the start of the coal handling application project to create a functioning system with fully developed software," said David Persichini. "An additional benefit of the wireless control system is the increased flexibility to apply different fieldbus systems, including EtherCAT. We therefore now use the control platform from Beckhoff in most of our control systems. To top it all, the new PC- and EtherCAT-capable wireless Triad controllers achieved around 30% in cost reductions on average," said Brian Landries.

Further Information:

Control Chief – www.controlchief.com
www.beckhoffautomation.com