

Two excom remote I/O stations with Profibus and segment couplers (left)



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The Chemistry's Right

In close cooperation Yokogawa and Turck developed Profibus DP lines with hot configuration in run (HCIR) functionality

Customer focus and solutions orientation are terms that are used primarily in the marketing departments. When customers really ask for a tailor-made product, the wheat separates from the chaff. Although special solutions demand higher costs, they can pay off for the manufacturer as well as for the customer. A collaboration-project between Yokogawa and Turck gives proof; together with their customer the companies developed a redundant connection of Turcks Remote-I/O-Systems, excom, and Yokogawa's process control system Centum VP.

Continuous process optimization

The former process control system was already showing its age and could no longer meet the latest technical requirements, such as in relation to interfaces like Profibus or OPC. When the regular overhaul of the plant was due, Sasol decided to make use of the downtime and replace the existing process control system. Turck's

excom remote I/O system, which was already installed in other plant areas, was to be used to connect the field devices in zone 1. At that time, the customer had chosen excom because it was the only remote I/O solution on the market that could be operated in zone 1 at 230 volts. Due to the long cable runs involved, alternative solutions based on 24 volts required large cable cross sections in order to compensate for the voltage drop.

The team responsible for connecting the new control system drew up a clearly defined specification profile: A redundant Profibus connection to the remote I/Os which must offer the ability to be expanded by card and also by station during ongoing operation. This online expansion function is known in specialist circles by the term 'hot configuration in run' or HCIR.

"At the time of the configuration, this standard had not yet been described in the Profibus user organization. This meant that solutions between the control system and I/O system supplier had to be developed individually," says Holger Schneider, sales specialist at



The redundant Profibus connection of the Yokogawa Centum VP control system increases availability

Yokogawa. After the initial talks between the customer, Yokogawa and Turck one thing was clear: Neither party could meet the customer's requirements on their own, so both companies worked in close cooperation to develop a configuration for their devices.

Tested by specialists

The product specialists of both companies adapted the software of the Yokogawa Centum VP control system and the excom firmware accordingly. After some internal tests, the interaction between the adapted systems was put to the test for the first time at the customers site in 2010. The process control engineers prepared a test environment in which an independent system generates a signal that reaches the Yokogawa system via the excom station and Profibus. There the signal is acquired by a software module, visualized, stored in a trend and then sent back as an output signal via the excom station. The trend function of the independent system enables the sent value to be compared with the received value in real time.

This test configuration enabled sawtooth signals (slowly rising and falling analog signals) and square wave signals (digital on and off signals) to be monitored during a HCIR operation. The test setup and the alternating signal provided a more detailed insight into the interaction between the control system and the remote I/O. Schneider describes the challenge when fitting a new module:

"You have to load the modified bus configuration in order to include new stations or additional cards on the bus. During loading, the bus is initialized for approximately two seconds. In this time all stations are disconnected momentarily. The stations must be able to detect this operation and distinguish it from a cable break. If this type of situation is detected, all input and output values of the system are held for this time. The operation therefore has no effect on the installation."

Solution through close collaboration

The first test dampened hopes of a speedy solution to the task as the team noticed an unwanted response: When a new module was added, the control system did not retain the last known process value as required. Instead the technicians noticed a momentary dropping off of the signal value. During the ongoing operation of the plant, this change in signal could have affected the production process or even caused a plant shutdown. The specialists from Turck and Yokogawa adapted the firmware once more, and were able to fine tune the system so that further test runs finally satisfied all the participants in the project.

After a total of 15 months of testing and implementation, the work had paid off for all involved: The customer is benefiting today from a solution that was not previously available on the market. Yokogawa and Turck have expanded their range of devices for these functions and have created additional value from the application. As Yokogawa sales specialist Schneider sums up, it was not just due to the specialist and product knowledge of employees: "The smooth and constructive cooperation between the specialists on site and the application engineers at Turck and Yokogawa enabled optimum solutions to be developed quickly. The chemistry here was just right."

Today, a so-called tokushu – the name given by Yokogawa to special software solutions that mature into standard products – now provides the Centum VP with an official software version for the control system, enabling Yokogawa customers to run their process control system together with excom in a redundant and HCIR-capable system. At Turck, the adapted firmware has now become part of the standard for the excom remote I/O system. Redundant communication and HCIR via Profibus-DP are now possible between Centum VP and excom without any problems. ■



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Quick read

When the replacement of a process control system was due in a chemical plant, the owners wanted a fail-safe and redundant solution with HCIR functionality. To meet this requirement, Yokogawa and Turck worked closely with the customer's specialists and developed a custom solution from which not only the customer benefits. The original special implementation has now been developed into a standard product by both manufacturers.