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China is the fastest growing industrialized country in the world in the chemical industry. Between 2005 and 2007, the chemical industry of the People's Republic of China was able to increase sales by almost 70 million Euro, thus becoming the third largest chemicals manufacturer worldwide. The metropolis of Tianjin, with a population in the millions, is benefiting from this boom. In addition to numerous other chemical producers, the port city at Hai He has been home to the Tianjin Chemical Factory – the largest Chinese producer of sodium hydroxide solution – since 1938.

Whether sodium hydroxide, monochlorobenzene, chloroform, epichlorohydrin or dichlorodiphenyltrichloroethane – the product portfolio of the Tianjin Chemical Factory is impressively comprehensive. These products are used in drain cleaners, solvents, two-component adhesives and insecticide.

In 2004, the Tianjin Chemical Factory expanded its production capacities with a new plant that produces vinyl chloride monomer (VCM). Vinyl chloride – the most important raw material for manufacturing PVC – is a poisonous, slightly combustible gas (igni-



The advantage of the modular design of the excom station: The up to 16 I/O modules – including the power supply packs – can be replaced during continuous operation in Zone 1

Intrinsically Safe Field Communication

In the Tianjin Chemical Factory, excom remote I/O stations transmit temperature measurement signals from the explosion-risk area reliably and efficiently

tion temperature about 435 °C), which first becomes a solid and polymerizes after peroxides are added. Because of these and other properties, temperature is the most important process parameter when manufacturing VCM. Even the actual production steps require controlled temperatures at all times. Too low a temperature would not just lower the reaction speed of the intermediate products, it can also destroy the catalysts.

That is why the Tianjin Chemical Factory uses seven type E thermo elements for temperature measurement in each of the 44 transformation systems

Quick read

In the VCM plant in the Tianjin Chemical Factory, temperature measurement signals have to be retrieved at 370 measuring points and forwarded to the controller level. Because classic point-to-point cabling would have been too expensive and time-consuming, Turck delivered both an efficient and comfortable solution in the form of its intrinsically safe remote I/O system excom.

The excom remote I/O, consisting of power supply pack, gateway, I/O modules, and racks, can be configured using 24 V DC or 230 AC voltage



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Wang Haiwen, Tianjin Chemical Factory

in which the addition of hydrogen chloride to acetylene occurs. Including the supply piping, a total of 370 measurements have to be transmitted from the explosion-risk area to the process control level. A task that the project managers could only have completed, in the case of classic point-to-point cabling via interface technology, with high installation costs and major maintenance expenses.

230 V operation for long distances

With a total of six intrinsically safe excom remote I/Os from Turck, the Tianjin Chemical Factory was able to solve the problem efficiently and reliably. The excom stations authorized for use in explosion-risk areas for Zones 1 and 2 are marketed and sold in China by the Turck subsidiary (Tianjin) Sensor Co. Ltd. (TTS) and offered the plant operators in Tianjin a major advantage: They can be installed and operated using either 24 V DC or 230 V AC voltage.

The latter is an enormous advantage primarily with long signal paths compared to other remote I/O stations, which are operated exclusively using 24 VDC. While, in some cases, much larger cable cross-sections have to compensate for the voltage drops that occur due to the longer cable lengths, Turck's excom I/O solution guarantees a stable power supply even with cable lengths of several hundred meters. This allowed the plant operators in Tianjin to achieve considerable savings on the installation.

“With excom, we were able to reduce the costs for cabling by 40 percent compared to our original plan,” explains Wang Haiwen, an employee in system management. Excom was also particularly user-friendly in case of a potential module defect. The up to 16 I/O modules can be replaced in Zone 1 during continuous operation. Thus, the remote I/Os

guarantee increased plant availability in the Tianjin Chemical Factory.

Asset Management with FDT/DTM

In addition to increased availability, hot swapping, and explosion protection, the system makes it possible for operators in China to comprehensively HARD parameterize their field devices via the bus line (Profibus-DP), as well as manage and diagnose using the Field Device Tool (FDT) and Device Type Manager (DTM): As a member of the FDT Group, Turck supports the concept right from the start that, like a PC manager, allows parameterizing and diagnosis data to be managed easily. The software's biggest advantage: The user no longer has to deal with managing the diagnosis data or the incompatibility of different “drivers” (so-called DTMs). Instead, users can concentrate entirely on the content of the data obtained, and thereby the plant's status - based on a comprehensive visualization program (e.g. PACTware).

Just like the I/O modules, the constantly updated excom DTMs offer a unique modularity that reflects the flexible structure of the overall remote I/O station. With the DTMs, the plant operators at the Tianjin Chemical Factory can manage the diagnosis data for the racks (backplane) just as easily as the data on the I/O modules used or even each individual channel. This allows the plant operators to localize malfunctions in the field faster and reduce expensive downtimes in the production chain. Fortunately, such a situation has not yet occurred at the VCM plant in the Tianjin Chemical Factory. “Since installation in 2004, communication via excom has been trouble-free,” says Wang Haiwen with a look of satisfaction. ■