APPLICATION NOTE Chemical

Level measurement of toxic and combustible acid water

- Storing waste products from nitrobenzene production in storage tanks
- FMCW radar measurement of acid water with organic substances
- Overfill protection in an ATEX Zone 2 environment

1. Background

An international supplier of organic chemicals produces raw materials such as aniline and various hexylamines at one of their sites in the Czech republic. The base chemicals are mainly sold to the rubber, pharmaceutical, agriculture or beverage industries.

As an essential precursor to their aniline production, the specialist chemical company uses nitrobenzene. This organic compound is basically produced through nitration of benzene with acids and water. The production process basically leaves acid water which, however, still contains a residual amount of highly toxic and combustible nitrobenzene. In order to protect the environment these liquid waste products have to be fed into a chemical wastewater treatment plant afterwards. Before the acid water gets cleaned, it is stored in several storage tanks (up to 6 m / 19.7 ft high) at atmospheric pressure.

2. Measurement requirements

Given that even a small amount of nitrobenzene in the acid water causes an explosive environment in the tanks, the level of the 50° C / 122° F warm liquid waste needs to be controlled on a regular basis. Whenever it exceeds a certain maximum level, an alarm is triggered to avoid overfilling and severe damage. The customer previously used devices from an older generation of radar level gauge. However, as they had reached a certain age, the customer was interested in replacing them with newer technology'. Therefore, the customer decided to gradually modernize the storage tanks with state-of-the-art level meters that also fulfill ATEX Zone 2 requirements for hazardous areas. When it came to replacing the first device, the customer was very keen to keep the original wiring for data acquisition to save installation costs.

KROHNE

3. KROHNE solution

For this application, KROHNE delivered an OPTIWAVE 5200 C. The non-contact, 2-wire FMCW radar level meter was fitted on the atmospheric tank with a DN 50 / 2" flange connection. The total length is 496 mm / 19.5". Given the long nozzle of the tank, the Wave Horn antenna features a 200 mm / 8" extension. The device was very easy and fast to commission via the local display.

As the device must be suitable for use in the potentially explosive atmospheres caused by the flammable substances in the tanks, an Ex d ia-approved version was provided. The antenna is made of gasket-free PTFE which makes the level meter particularly well suited for measuring the level of corrosive acid water in the tanks. Given the outdoor nature of this application, a weather protection for the device was also mounted.

OPTIWAVE 5200 Ex d ia mounted on tank nozzle

4. Customer benefits

The chemical company is benefiting from the reliable and stable measuring values of the KROHNE level device. Whenever the acid water exceeds a given level in the tank the OPTIWAVE 5200 triggers an alarm by transmitting the measured value via 4...20 mA current output to a control room. In doing so, the OPTIWAVE 5200 enables the customer to shut down the process immediately so as to prevent the tank from overfilling. Thus, a very high level of safety for the whole plant can be maintained. The level meter could also be used in a Safety Instrumented System (SIS) as it fulfills SIL2 requirements.

The KROHNE level meter also turned out to be very cost-effective for the customer. No costly process interruptions were necessary during the installation of the device, given the fact that the OPTIWAVE 5200 can be easily commissioned via display and without any special settings or new wiring for data acquisition.

The specialist chemical company is very satisfied with the reliability of the KROHNE level meter and is planning to systematically replace all of the old level gauges with the OPTIWAVE 5200.

5. Product used

OPTIWAVE 5200 C

- 2-wire / 10 GHz Radar (FMCW) level meter for liquids, pastes and slurries
- Modular housing and antenna design
- Quick coupling system permits removal of the converter under process conditions
- Backwards compatible with all BM70x level meters
- Measuring range: up to 30 m / 98.4 ft
- PACTware™ and DTM provided free of charge and with full functionality
- Remote converter: up to 100 m / 328 ft away from the antenna
- Display text in 9 languages (incl. Russian and Chinese)
- SIL2-compliant according to IEC 61508 for safety-related systems

Contact
Would you like further information about these or other applications?
Do you require technical advice for your application?
application@krohne.com

Please visit our website for a current list of all KROHNE contacts and addresses.

www.krohne.com