



APPLICATION NOTE Energy

Level Measurement of Biodiesel in a tank farm

- High accuracy and repeatability for optimised tank farm inventory
- One-stop-solution for over a 100 tanks
- Factory calibration for highest measurement requirements

1. Background

Biodiesel and other renewable energies have become an important issue worldwide with the rising prices of fossil fuel. A recently built European tank farm with more than 100 stainless steel tanks provides a storage capacity of over 100 000 m³. The plant uses waste flows from various processes as raw materials for other processes – in order to produce biofuel and green power on a large scale. Its biodiesel production is partially based on waste cooking oils and fats from the catering industry.

2. Measurement requirements

The plant runs with a fully automated tank inventory system and was looking for cost-effective and accurate level devices capable of measuring the low reflective medium of 108 fuel tanks with great repeatability. The devices had to come pre-calibrated to reach an accuracy of ± 2 mm (on 20 m) with repeatability better than 1 mm and should not be affected by variations in dielectric constant.



3. KROHNE solution

For this application, KROHNE delivered 108 OPTIFLEX 1300 C 2-wire guided radar (TDR) level meters. These were equipped with 4 mm diameter single cable probes with a length of 20 m. Connection type was G 3/4" A ISO 228. Each device received specific factory calibration on KROHNE industrial calibration rigs to reach the customer requirements in terms of accuracy and repeatability.

Although the TDR (Time Domain Reflectory) principle relies on the dielectric constant of the medium, the meters are not affected by variations in product characteristics: fitted on the tank roof, the meter transmits low-intensity electromagnetic pulses along its cable probe. These pulses move at the speed of light. When the pulses reach the surface of the product to be measured, they are reflected with an intensity that depends on the dielectric constant (ϵ_r) of the product. The device measures the time between emission and reception of the pulse: half of this time is equivalent to the distance from the reference point of the device to the surface of the product. The time value is converted into a current output of 4...20 mA and/or a digital signal and transmitted to the control room to track the fuel stock of each tank.

4. Customer benefits

In this application, high measurement requirements were fully met with a robust technology at a competitive price. By installing just one device on each of the 108 tanks, the customer easily monitors the biodiesel stock in the whole tank farm. With a measurement accuracy of $\pm 0.01\%$ and repeatability higher than 1 mm, the stored quantity is determined close to a few hundred litres. Each device is also capable of detecting a possible water interface below the oil layer. This allows for optimised fuel stock inventory. In addition, our customer saves a considerable amount of money not only in the beginning but also in the long run: the 2-wire OPTIFLEX 1300 C Level Meters need less wiring, are easy to install without commissioning and maintenance-free.

5. Product used

OPTIFLEX 1300 C

- Universal level measurement device for liquids, pastes, granulates and powders
- Easy installation, commissioning and operation
- Maintenance-free
- Specific factory calibration for increased accuracy and repeatability
- Suitable for flange temperatures up to 300°C and pressures up to 300 bar (process conditions can even be higher)
- Measurement of interfaces starting at 50 mm



Contact

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