APPLICATION NOTE

Power Generation

Level measurement of sodium hypochlorite (NaOCl)

- Reliable stock monitoring of NaOCl solution for the water disinfection system of a power plant
- Continuous, non-contact radar level measurement of a corrosive biocide
- High degree of process and occupational safety: measurement through a protective PTFE seal disc using a flush-mounted 80 GHz level radar
- Replacement of level transmitters with corrosion issues

1. Background

An electric utility company operates a Combined Cycle Gas Turbine (CCGT) power plant in the Southeastern United States. The power station has its own water disinfection system. It keeps the condenser clean to achieve the highest possible efficiency of the power plant's Rankine cycle.

2. Measurement requirements

Fouling and scaling can have a significant impact on the efficiency of the power generation process and may even be a safety hazard. Suppressing biofilm formation in pumps, steam condensers, filters or cooling towers is thus an essential task in the management of any electric power plant utilizing an evaporation cooling system. The hygienic operation of the evaporative cooling system effectively protects the surrounding population from hazards such as legionella.

To this end, the circulating water/condensate is injected with sodium hypochlorite (NaOCl) which is one of the most effective broadband disinfectants. To guarantee an uninterrupted supply of this biocide, the plant operator keeps tracking its stock inventory. The biocide is stored as a diluted liquid in 3.5 m high tanks. Given the strong oxidizing effects of NaOCl, the tanks are made of corrosion resistant glass fibre-reinforced plastics.

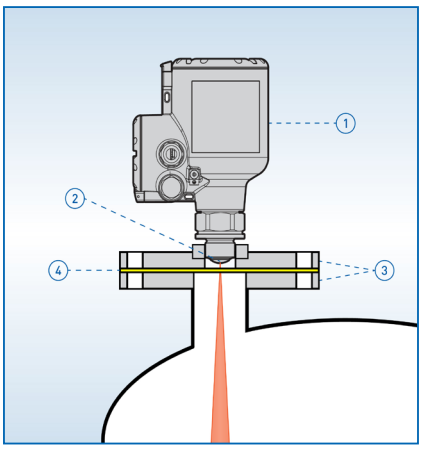
A reliable, long-term stable and safe level measurement is essential for stock management of NaOCl. Having faced severe corrosion issues with previous level gauges, the utility company started screening the market for level transmitters that were able to meet the demanding conditions of the medium.

KROHNE

3. KROHNE solution

The OPTIWAVE 7500 FMCW radar was tested by the customer and found to be the most suitable level transmitter for this application. Given the height of the tank, the 80 GHz radar was provided with a small ¾" (~DN20) Lens antenna. The antenna design allowed the non-contact radar to be flush mounted into the tanks using the existing ¾" thread connection.

Installation of level transmitter with PTFE sealing between flange and Lens antenna



1 OPTIWAVE 7500
2 Lens antenna of 80 GHz radar
3 Flange connection
4 PTFE sealing disc

Given the previous experience with the highly corrosive biocide, the customer decided to mount a PTFE-sealing disc between the radar antenna and the flange to avoid any contact of the device with the sodium hypochlorite. This is feasible as the radar signal penetrates the plastic sealing. However, it would also be possible to directly fix the OPTIWAVE 7500 on the tank where it would measure right through the closed roof, as the signal penetrates all non-conductive materials.

4. Customer benefits

The energy company benefits from continuous, uninterrupted monitoring of the sodium hypochlorite stocks. Accurate and reliable inventory management ensures the operator that the water-steam cycle can be disinfected at any time required. Regular removal of biofilm and scaling in the pipes help maintain the integrity of condensers, steam generators and other equipment. This allows maintaining the plant's high efficiency as fouling and scaling have a significant effect on heat transfer and cooling procedures which in turn causes performance issues. In addition, worker's safety is considered as well with legionellae and other dangerous pathogens being removed by disinfection.

The customer is extremely satisfied with the use of the OPTIWAVE 7500. The radar level transmitter allows safe and long-term stable operation with the additional benefit that in the unlikely event of maintenance, service engineers will not be exposed to the tank substance. Since the radar can measure through any non-conductive tank or sealing material, occupational safety is significantly increased. With the KROHNE level radars "working like a dream" – as the responsible plant engineer put it – the customer has also started using the 80 GHz radar at other sites where corrosion had previously affected the level measurement of NaOCl.

5. Product used

OPTIWAVE 7500 C

- Radar (FMCW) level transmitter for liquids, e.g. chlorine-based solutions and other aggressive chemicals
- Measurement through tank roofs made of non-conductive material (e.g. plastic, fibreglass or glass)
- Non-contact 80 GHz radar, flush-mounted Lens antenna

Contact

Would you like further information about these or other applications?
Do you require technical advice for your application?
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