



APPLICATION NOTE Food & Beverage

Level measurement of edible oil in a deep fryer

- Monitoring frying oil level in the production of frozen food products
- Continuous, non-contact measurement of a hot and steaming liquid in a very small tank
- Improved frying conditions for an increased product yield

1. Background

A Norwegian food manufacturer has specialised in frozen food products, ranging from fish and ready meals to vegetables and pastries ending up with frozen fruit dishes. Among others, the frozen food producer supplies retailers, restaurant chains, foodservices as well as other food manufacturers.

2. Measurement requirements

Depending on the final food product, some ingredients are fried in a deep fryer before they are further processed in a tunnel freezer and prepared for delivery. During the deep-frying process, the food is submerged into oil at high heat of +185...190°C / +365...374°F. The fryer tank is just 50 cm / 1.64 ft high.

To optimize the frying process in terms of oil consumption, energy consumption and product yield, the oil level in the fryer needs to be monitored. Previously, the customer did not carry out continuous level measurement in the tank, checking and adapting the oil system manually from time to time.

In order to obtain more stable frying conditions, the operator decided to look out for a non-contact level transmitter. It was not only required that the level instrumentation be suitable for accurate measurement at extremely low measuring distances. The level device also had to be resistant to the hot oil vapour from the fryer.



Deep fryer

3. KROHNE solution

KROHNE recommended the installation of the OPTIWAVE 3500 C radar level transmitter. This 80 GHz FMCW radar is particularly suitable for food applications in small and narrow vessels with very low measuring distances. The level transmitter has been provided with hygienic PEEK Lens antenna (DN25) and was mounted by way of a bracket above the deep fryer.

The very small beam angle of the radar and its high signal focussing allowed the device to be installed far enough above the fryer. In this way, the KROHNE level transmitter is still able to measure through the narrow top hole of the deep fryer right into the medium. Yet, it is still installed far away enough from the hot medium to avoid product-built up and overheating.

The OPTIWAVE 3500 continuously monitors the oil level in the fryer tanks. The measuring values are transmitted via 4...20 mA output to a control room.



Level measurement of hot edible oil



4. Customer benefits

The food producer benefits from improved frying conditions. Due to the stable and reliable level measurement of frying oil in the very narrow and small tank, the customer is now able to only add edible oil quantities that are really required to best meet the production criteria.

The OPTIWAVE 3500 provides extremely stable and reliable measurement values, despite the hot oil vapour. In this way, there is no overflowing of the vessel, or no oil shortage in the fryer either. As a result, the best possible product yield can be obtained by the food company.



OPTIWAVE 3500 mounted above the tank of the deep fryer



Flush-mounted FMCW radar

5. Product used

OPTIWAVE 3500 C

- Radar (FMCW) level transmitter for edible oil and other liquids in the food and beverage industry
- Continuous, non-contact level measurement in high and narrow, small and agitated tanks
- 80 GHz radar, gasket-free Lens antenna
- Measuring range: 0...50 m / 164 ft
- -40...+150°C / +302°F; -1...25 barg / -14.5...362 psig



Contact

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