FMCW Technology Radar Provides Reliable Level Measurement in a Palm Oil Tank

RESULTS

- Increased reliability and availability of tank operation.
- Maximized utilization of tank storage capacity
- Extended reliable level measurement to under-heating coil
- Reduced maintenance costs

APPLICATION

Level of Palm oil in storage tanks.

Palm oil is an edible oil derived from the fruit of the oil palms

APPLICATION CHARACTERISTICS

- Low dielectric constant in a range of 1.7 - 1.8.
- Become solidified at operating temperature below 40 degC.
- Stored in a tank with heating coil near tank bottom, appr 800 mm.
- Tanks height above 20 m but in smaller diameter of around 10 m.

CUSTOMER

Palm oil processor, Malaysia.

CHALLENGE

As business grows and market demand on palm oil increases, the customer expanded its storage capacity of existing tank farm by adding new tanks, with dimension of 27 m tall but smaller in diameter due to limited land available. Only technology of non-contact radar is approved for level measurement in consideration of tendency of solidification of palm oil at lower operating temperature or when heater is cut-off.

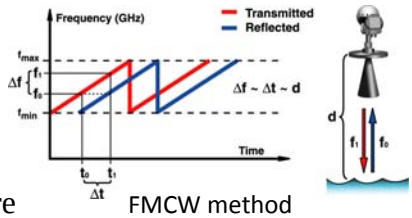
Taller tanks but in smaller diameter Due to limited land available

Customer had some poor experience on their existing non-contact radar level transmitters from other supplier, pulse technology radar level transmitter with 4” cone antenna. Most of them couldn’t provide a reliable level measurement for such application, were requested for frequent servicing and not capable to measure product level below heating coil. Operation was interrupted sometime due to incorrect level measurement or level not available, hence more frequent manual gauging of tank level was required. In additions, operation was not able to monitor and control at very low tank level when changing product batches.

Heating coils near to tank bottom

SOLUTION

Rosemount PRO is more suitable for such application, a FMCW technology (frequency modulated continuous wave) radar level transmitters in comparison of pulse radar. PRO is able to handle difficult tank conditions (heating coils and mixer near to tank bottom) and longer measuring range (more than 20 m) due to its ultra-high sensitivity and unique signal processing features, the radar doesn't require for re-calibration and has stable performance during temperature shifts, thanks for digital reference.

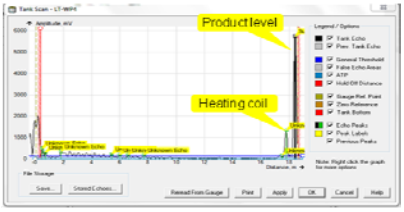


FMCW method

Parabolic antennas are proposed and installed for all new tanks. It is the most suitable antenna for longer measuring range and able to be installed nearer to tank wall for its most narrow radar wave beam, a parabolic antenna produces more focus radar wave and is insensitive for contamination on antenna due to its larger antenna disc.


PRO parabolic antenna and multi-spot temperature sensor

In a tank with heating coils, orientation of PRO parabolic antenna can be rotated by 90 degree to avoid the risk that radar level transmtier measures false level by locking on heating coil near to tank bottom. With Rosemount Radar Master software, the heating coils and other mechnical obstruction can be identified and filtered.



PRO parabolic antenna measures tank level below heating coils

With Emerson Smart wireless solutions, it helps customer save thier material cost - signal cable, trunking for cable; labor cost - installation of cable, loop check; and their project execution time – installation and commisioning.


PRO wireless on each tank