Radar Overview and Best Practices for ISA Toledo Section

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Guided Wave Radar works well with Foam and “Heavy Vapers”

Images:
http://frankenmuthbrewery.com/12-fun-facts-beer-foam/
https://www.reddit.com/r/justneckbeardthings/comments/4gtxyb/which_type_of_vaper_are_you/
Best Practices

• Foam and heavy vapors—GWR is preferred for foam and vapor applications as the signal stays in contact with the cable or probe, so it generally “sees” through the media to find the liquid level. FSR may work with some types of foam and vapors, but it is often a trial and error application. Its’ signal may lock onto the top of the foam as the level or get absorbed by the vapors. Low frequency FSR generally has a better success rate than higher frequency radar due to larger wavelength that doesn’t get absorbed as easily.

“Heavy Vapers”
Image: https://realorganicvapors.com/
Best Practices

- High viscosity liquids – FSR is preferred as it won’t contact the liquid. GWR also works but a viscous liquid may have potential to build up on the probe or cable and requires periodic cleaning.

Image: [http://syntheticlubricants.ca/](http://syntheticlubricants.ca/)
Best Practices

• Abrasive and corrosive liquids – for both types of radar, proper material selection is key. FSR is preferred as it is non-contact. GWR may require an exotic metal or material probe such as Hastelloy-C.
Best Practices

- Agitated and turbulent (agitated) processes – both types of radar may have difficulties with attempted direct level measurement of agitated surfaces. Using a GWR with a coax antenna often offsets agitation effects. Stilling wells (like a large coax antenna) or a bypass chamber may be used with FSR to remove them from the agitated liquid and measure level of a “calmer” surface.

Best Practices

• Interface – GWR can measure interface if certain conditions are met which include a difference in dielectric constants (Dk) of the fluid and lack of large emulsion layers. Ensure manufacturer’s guidance is followed.
Best Practices

• Applications with fluctuating Dks – with both types of radar, plan your application around the liquid with the lowest expected Dk. Using that worst-case scenario will ensure good measurement of other liquids with higher Dks. GWR is preferred here as it usually allows better measurement of low.

Image: http://syntheticlubricants.ca/
Best Practices

• Heavy vapor applications – similar to foam applications with heavy vapors that may absorb some of the microwave energy, robust GWR technology is preferred. If FSR must be used due to the application, low frequency radar is preferred.
Best Practices

• If end users and engineers look at the FSR market today, there are a myriad of choices and each has their own strengths and weaknesses. FSR features many different radar frequencies (10 GHz, 24 GHz and 80 GHz), and two different types of technology – Frequency Modulating Continuous Wave (FMCW) and Pulse.