INSTRUMENT VERSATILITY IS NOW A VIRTUE

According to **Stephen B. Harrison**, Nexant E&CA, guided wave radar is a well-established level measurement technique, but is sometimes considered difficult to install. He believes this is all set to change thanks to embedding digital algorithms into devices

As a measurement technique, guided wave radar is well established. The equipment is robust, the technology is mature, and the primary application niches have clearly emerged. However, the instrumentation has developed a reputation for being difficult to install. But digital algorithms embedded into the latest devices mean that the chance of getting the installation right first time is increased.

The innovation taps into two mega-trends: digitalisation for productivity and the scarcity of skilled labour. Modern devices can be installed by instrument technicians in a fraction of the time that previous models required and with the confidence that they will work from day one. That's especially important when fitting out a tank farm with four or six tanks because the instrument technician will want to complete the installation within a day and return to base. These benefits are attractive in the cost-conscious 2020's, especially since Coronavirus has caused the oil price to crash.

The guided wave radar level measurement principle relies on the radar wave partially reflecting from the upper crude oil layer and partially penetrating to the oil-water interface, where it is then reflected from the water layer. The most common application is in crude oil storage tanks at remote oil well locations. These tanks receive a multi-phase mixture of crude oil and water from the well-head and perform an initial physical separation between these two liquid phases.

Level monitoring in the crude storage tanks is essential to efficiently schedule the crude oil collection transport. Good logistics management can avoid inefficient part-loads or production stoppages if the storage tanks get too full. Beyond that, measurement of the water level underneath the oil layer is important to ensure that the water can be pumped off and all the available tank storage capacity can be used for the oil. With storage capacity around the world at a premium during the Covid-19 crisis, this feature has been a major benefit of these systems.

Crude oil collection and storage tanks, Oregon USA. Maximising crude oil storage volume is essential during the Covid-19 crisis

THE IMPORTANCE OF ACCURACY

The accuracy achievable with the guided wave radar level instrumentation is better than 2mm. This is a valuable benefit in inventory management in the chemicals sector. For high value corrosive liquids, such as acids or molten sulphur, there are few choices for non-invasive level measurement and these applications are the home turf of guided wave radar level measurement instruments. However, with high value products in large diameter tanks, a few millimetres of level can equate to several thousand Euros-worth of inventory. So, high precision measurement is essential to ensure reliable book-keeping and fair product transfer valuations and invoicing.

High precision measurement helps ensure reliable book-keeping and fair product transfer valuations and invoicing in the chemical storage industry

As a rule of thumb, for every four guided wave radar level instruments used for liquids, there is typically one more that is used for the measurement of dry solids - generally meaning powders. These tend to be materials-handling and storage applications in the metals processing, chemicals, food and pharmaceutical sectors. With no moving parts to malfunction, the guided wave radar technology suits situations where corrosive powders may be kicked up into the storage tank head space during mixing or product transfer.

Moreover, guided wave radar instrumentation can 'see through' dense dust or thick misty vapours. This is one of its main advantages when compared to non-contact level measurement techniques.

DOUBLE-EDGED SWORD

The versatility of the guided wave radar technique has, unfortunately been a double-edged sword: setting up these instruments has been a technically complex task and that has been their main limitation since their introduction about two decades ago. Specialist expertise has generally been called in to do the installation, configuration and, in many cases, a follow-up trouble-shooting visit. The installation labour and service costs have often exceeded the instrument hardware cost by a factor of two.

This is the pain point that instrumentation producers have rectified with algorithms which allow the instrument to be configured with the input of basic information about the application. Significant set-up time and cost reductions are the result. This kind of intelligence might just be the catalyst to transform the reputation that this type of equipment has to being 'easy to install' in addition to accurate, robust and reliable. This will widen its field of application and broaden its popularity and acceptance in existing applications. Its versatility can become an unbridled virtue.

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