The challenge to asset owners and operators is to use new systems to reduce out of service time during inspection and improved inspection schedules.

Increasing inspection activity

Storage tanks are an essential part of the distribution network and are vital in buffering the varying demands of users. They are most commonly built from steel with thicknesses from 5-15mm. Steel is a relatively cheap and strong material that can be easily fabricated on site but does have the inherent problem of corrosion over time.

The inevitable corrosion of the floor of the tank is a particular issue as it requires emptying and cleaning of the tank, taking it out of service during the weekend when demand is at its peak. This is an expensive and time-consuming process, and even more so when a storage site is near capacity, resulting in lost income as well as the cost of inspection.

An atmospheric storage tank floor presents the tank engineer with the combined problems of needing to inspect large areas up to thousands of m² efficiently whilst also identifying millimetre sized corrosion that could lead to leakage. This challenge was first investigated over 20 years ago which resulted in wide use of the magnetic flux leakage (MFL) technique to provide a rapid screening of the floor, followed by detailed ultrasonic thickness measurement of suspect areas. These first MFL scanners were more or less just to give an indication of where magnetically significant areas were.

This resulted in the development of computerised MFL scanning of tank floors, which is the detailed report that is created during the inspection and reporting procedure. Good automated recording software ensures a consistent format is used in the final report. This is a clear benefit for the tank engineer who may have to make data comparisons and interpretations for many sets of tank inspection results over a period of several years.

Most computerised MFL reports will automatically show the areas that have been covered by the scanner. The report can tell exactly which areas of the tank floor have been inspected, and more importantly, which areas have not. This helps the tank operator decide if any additional inspections are required, and also introduces a further layer of basic quality control and reduces human error - it is actually quite difficult to accidentally miss out any areas during a computerised MFL inspection.

creep corrosion is a result of underfloor conditions which may be harder to overcome. Visual inspection is relatively easy, but requires separate logging of the results which may cause errors, and could be impossible on normally coated tanks without expensive removal and re-coating.

There have been a number of alternatives to MFL developed to help overcome the top/bottom identification challenge and to try and improve defect sizing accuracy. These typically use eddy current methods, sometimes on their own, and sometimes in conjunction with MFL sensors in the same system. These techniques have been proven in popularity, although they may require a higher level of operator training to ensure correct setup, and be less portable in the tank environment due to higher power requirements.

Ultrasound inspection specialist Silverwing, in conjunction with Sheffield University, has undertaken key research to improve both the accuracy of MFL defect sizing and identification of top or bottom side material loss. The resulting patents have been developed and incorporated into the Silverwing Facomor 3D product, released in February 2012.

The system uses a very high number of MFL sensors in multiple orientations to detect all magnetic field changes, giving much improved resolution for detection of smaller defects below 3mm, and application of data processing to differentiate between shallow, deep indications and longer defects with less wall loss. An additional set of sensors detect the magnetic effects from top side defects, giving clear identification of top and bottom corrosion without the need for visual checking. The advanced magnetic designs also achieve better signal stability and reduced crack propagation.

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