# Improving confidence in tank inspection

Tank inspection is an important part of effective asset management, from both regulatory and operating efficiency perspectives. A failure of a tank can be catastrophic, but probably more likely is degradation resulting in slow loss of stored product and possibly contamination of the environment.

Any unscheduled removal from service can impact revenues from loss of capacity, and potentially lead to higher repair costs as a faster response is required. To manage this degradation inspections are carried out on a regular basis and repair work planned accordingly. These inspections must therefore inspire confidence that they have identified any degradation correctly to avoid either unnecessary repairs or unexpected failure. A particular issue with any tank floor inspection is that once the tank is re-filled it is very expensive to cross check any inspection.

Inspections are often carried out by experienced third party inspection companies which deliver a report on condition. Careful selection of these companies will certainly improve confidence in results, but any asset operator should be aware of the inspection process and challenge the inspection to deliver the highest possible quality.

# **Training**

Any task can be improved by ensuring people are trained to perform what is required and this is no different in tank inspection. There are very good training programmes for tank engineers and inspectors such as API 653 and EEMUA for understanding tank assessment, and any inspection should be overseen by a qualified engineer. In addition to these tank specific engineering qualifications the inspection team should also be certified in the nondestructive testing (NDT) techniques applied. This should cover as a minimum ultrasonic testing (UT), Magnetic particle testing (MPI), and preferably Magnetic Flux Leakage (MFL), or other techniques used to inspect the tank floor. Certainly UT and MPI training is widely available through PCN or ASNT schemes. Specific technologies such as MFL are not so prevalent, but manufacturers of this equipment can provide bespoke training programmes which should be completed as a minimum.

Alongside these technical programmes thought should also be given to simple visual testing as much can be identified from a trained eye before any measurement tools are used. The technician

should be trained to complete an initial assessment to not only identify anv visual defects, but also to ensure the tank to be inspected actually meets the design specifications. It is not unusual on older tank

for the as built condition, or subsequently repaired state to be different to that detailed in design documentation.

# **Procedures**

Assuming there are trained technicians the next important control is effective, detailed procedures. These procedures should cover every aspect of the inspection in detail so the asset owner can be sure of what will be done. Any procedure should also be signed off by an appropriate Level III trained person. An effective procedure will:

- Identify the required preparation of the tank
- Guide the technician to ensure correct application of equipment.
- Explain how to assess any indications
- How to record any indications
- Ensure safe working practices
- Apply the most efficient work methods

The inspection provider should also be able to demonstrate the procedures it has are implemented correctly and independently

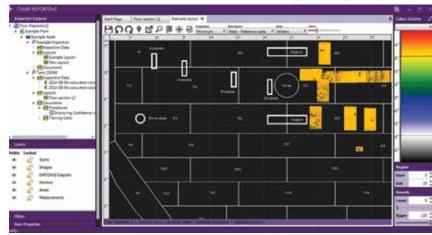
verified for compliance by third party assessment such as ISO9000, or UKAS and international equivalents.

Any procedures to be used should be recorded for future reference as these will be clear about what has, and has not, been inspected.

# Capability of equipment

As with any task having the best tools available will help the technician to achieve best results. There are continued advances in new NDT technologies that can improve detection of defects and accuracy of sizing. The better the inspection tools the higher confidence we have in the results, assuming the aforementioned procedures are implemented correctly.

However, all systems have some limitations and knowing which tool is best to apply for each measurement is important. The actual condition of the tank being inspected will also influence measurement accuracy, and this should be considered. For example, a clean 6mm thick floor with no coating will give very good results



Example data archive with Silverwing C-map inspection management tool

# asset management

in MFL, but a thick 15mm annular plate with coating will reduce the accuracy and detection capability.

NDT techniques can be complimentary, and in some cases they may need to be combined to give the best result. Again this comes back to the detailed procedure to guide the technician, and what assessment on site should be done to decide which approach to take.

### Verification of results

As an inspection is performed verification of results should be carried out to cross check any indications, and also ensure the procedures are being followed. This is easier to do with that latest inspection tools such as the Silverwing Floormap 3Di or Scorpion wall crawlers as all calibration data and measurements are recorded digitally. It is entirely possible for inspection results

to be sent off site for review by a level III, who can see what has been done and make an assessment of the inspection.

For in tank inspection it is very important to complete the verification whilst tank access is available, but for external inspections these can be carried out later. There is at least one inspection company in the US that has embraced this and can provide remote level III assessment of its inspection by sending live inspection data to its assessment team.

# Archiving of results and data sharing

Traditionally an inspection will deliver a paper copy of the results with an assessment that can be archived. This is a very useful document but does not give full access to the inspection data, limiting any future analysis of results.

When full data capture

of measurements and calibrations is done this data can be subsequently reviewed to see what the technicians carried out, and also re-process with new accept/reject limits as requirements change.

By recording all measurement data it also gives the opportunity to reprocess with new analysis techniques that can improve the quality of measurements without re-scanning. It is therefore possible to improve understanding of asset condition, and potentially extend working life as a result.

Companies such as
Silverwing are also developing
inspection database
management tools, such as
C-Map, that will provide easy
access to inspection results
across multiple sites, making
an inspection a live document
that can be shared between
engineers and sub-contractors
such as repair teams,

and also make historical comparisons for risk based inspection (RBI) much easier.

### Conclusion

If an inspection is performed with attention to training, procedures employed, use of the latest technologies, verification and data analysis it is possible to have a high confidence in the inspection, whilst remaining efficient and cost effective. With improved archiving through database management tools, leading to easy interpretation of data with powerful analysis tools, it will in future aid tank engineers to make decisions based on higher confidence in the inspection, with potential to reduce the operating safety margins and therefore cost.

# For more information:

This article was written by Wayne Woodhead, CEO, Silverwing, www.silverwingndt.com