Modern corrosion mapping of storage tank bottoms – notable advancements in critical zone coverage, inspection efficiency and data integrity.

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Abstract: Every day, an NDT report will govern key decisions and inform inspection strategies that could affect the flow of millions of dollars which ultimately affects local environments and potential risk to life.

There is a direct correlation between report quality, and equipment capability. The more able the equipment in terms of efficient data gathering, signal to noise ratio, positioning and coverage then the more actionable the report, resulting in optimal maintenance and repair strategies providing that the report is clear and well presented.

Furthermore, when considering tank floor storage inspection, it is essential that Asset Owners have total confidence in inspection findings and the ensuing reports. Tank floor inspection equipment must not only be efficient and highly capable but data sets should be traceable and integrity maintained throughout.

Corrosion mapping of large surface areas, such as storage tank bottoms is an inherently arduous, difficult and time consuming process. Magnetic Flux Leakage (MFL) based tank bottom scanners represent a well-established and highly rated method for inspection. There are many benefits of using modern MFL technology to generate actionable reports, chief among those are; efficiency of coverage while gaining valuable information such as defect location, severity, surface origin, as well as extent of coverage.

More recent advancements in modern MFL tank bottom scanners afford the ability to scan and record data sets at areas of the tank bottom which were previously classed as dead zones/or areas which were not scanned due to physical restraints, thus increasing overall inspection coverage, quality and traceability. Inspection of these areas, including the ‘critical zone’ or areas close to the annular to shell junction weld allow engineers to quickly determine the integrity of arguably the most important area of the tank bottom.

Herein we discuss notable developments in critical zone coverage, inspection efficiency and data integrity that culminates with the delivery of an actionable report that the Asset Owner can interrogate and from which develop pertinent and accurate maintenance and repair strategies.
MODERN CORROSION MAPPING OF STORAGE TANK BOTTOMS

NOTABLE ADVANCEMENTS IN CRITICAL ZONE COVERAGE, INSPECTION EFFICIENCY AND DATA INTEGRITY

Date: July, 2023

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AGENDA

• Brief history of industrial storage tanks
• Traditional methods of storage tank bottom inspection
  • Ultrasonic testing (UTTG)
  • Visual Inspection
  • MFL Screening
• Recent advancements in MFL inspection
  • Critical Zone Coverage
  • Total Inspection Efficiency
  • Data Integrity
• Conclusion
STORAGE TANK BOTTOM INSPECTION

A BRIEF HISTORY...
STORAGE TANKS – A BRIEF HISTORY…

• Late 1800’s
  • Industrial age – more use for oil, petroleum, chemicals
  • Need for durable/large capacity tanks

• Early 1900’s
  • Increased use meant increased risk
  • Need for codes and regulations for flammable/combustible product storage

• Late 1900’s
  • Inspection of tank bottoms were limited and error prone
  • 1988 – Saunderson tasked with developing an improved solution …
Traditional methods of tank bottom plate inspection

- Ultrasonic Testing
- Visual inspection
- MFL Screening
STORAGE TANKS – A BRIEF HISTORY...

• Traditional methods of inspection
  • Ultrasonic Testing
    • 5 spot measurements per floor plate
    • Targeted at soilside defects
    • Less than 1% coverage
    • Low POD

  • Visual Inspection
    • Targeted at product side defects only
    • Defects could be missed
    • Low POD

• Saunderson's revolutionary method
  • Magnetic Flux Leakage (MFL)
    • Increased coverage
    • Soil and product side detection
    • High POD
STORAGE TANK BOTTOM INSPECTION

MODERN ADVANCEMENTS IN MFL TECHNOLOGY...
ADVANCEMENTS IN MFL INSPECTION

• Globally recognised and accepted method of inspection

• Combined technology
  • High resolution MFL – X, Y positional information/ severity of defect
  • STARS – Top/Bottom side discrimination...
    ..even through coatings
MODERN ADVANCEMENTS IN MFL INSPECTION

• Data collection and recording
  • Onboard intuitive software
  • C-Scan imaging
  • Calibration for defect sizing

• Data accuracy/integrity
  • Improved S/N ratio
  • Increased POD
  • Better sizing

• Interactive laser line guide
  • Relocate to specific areas/defects
  • Efficient prove-up
FURTHER ADVANCEMENTS IN MFL TECHNOLOGY

• Increased, comprehensive coverage
  • Scan speeds of 1m/second
  • Curved/angled mapping
  • Critical zone coverage
  • Deadzone coverage
  • Adjustable bridge height for undulating floor plate

• Rotational magnets
  • Adjust levels of saturation for thicker material
  • Switch off magnets for transit and operational positioning
  • Reduced cleaning times
FURTHER ADVANCEMENTS IN MFL TECHNOLOGY

Paperless Reporting

• Software built for processing very large data sets, and minimizing time to report delivery
  • Intuitive user interface with easy workflow
  • More detailed and faster report generation
  • Global view of all available data (STARS / MFL / Sizing)
  • Improved report quality and consistency with custom templates
  • Exportable reports and indication lists
MODERN ADVANCEMENTS IN MFL INSPECTION

Comprehensive repair planning tools

• Powerful, drag and drop repair plate design
• Automated repair list, with material and weld length calculation
MODERN ADVANCEMENTS IN MFL INSPECTION

Automate the Report

• Methods to create report:
  • Report Wizard – Check box selection
  • Blank Report – Build our own format
  • Load Report – create report from your template
MODERN ADVANCEMENTS IN MFL INSPECTION

Automate the Report

• Automated, high quality report composition
• Powerful, customisable and easy
• Output to paper, Word, PDF or .CSV
CONCLUSION

In conclusion, it’s clear that tank bottom inspection via MFL/STARS technology can deliver...

- Increased coverage with single technology and reduced reliance on supplementary inspection systems
- Probability of Detection that far exceeds regulation demands
- Reductions in tank outages via total inspection efficiency and coverage

Resulting in...

- *Optimal maintenance and repair strategies*
THANK YOU!

HOW CAN WE HELP?

www.eddyfi.com

QUESTIONS?