

Case Study

Vopak Singapore: Tank Bottom Inspection of an In-Service Naphtha Storage Tank

Project Specification

- Scope: Online tank bottom inspection
- Object details: 10,000 cbm naphtha, 25.4 m diameter, fixed roof, 24-inch manway entrance
- Location: Sebarok Terminal, Singapore
- Customer: Vopak

The Challenge

The first online / no man entry inspection of a low flashpoint (ATEX zone 0) product tank in the industry in Asia and for Vopak worldwide. Therefore, it required very close collaboration between Vopak, Intero, the Product Owner, and Local Authorities.

The project had two main objectives:

1. To demonstrate the ability to safely deploy a Tank Explorer online tank inspection robot in a tank with a low flashpoint product.
2. To perform an online inspection of the tank bottom in a limited timeframe.

Once the robot was deployed, several reconnaissance runs were completed. During these reconnaissance runs, observations of sediment and sludge on the tank bottom were made with the cameras of the ROV.

Below were the following areas of concern:

- Low flashpoint product
- Close cooperation and coordination between all stakeholders
- Sediment / sludge layers up to 30 cm consisting of fine rust particles
- A limited timeframe to perform the inspection



Our Solution

Together with Vopak, the product owner, and local authorities; a review of the operational and equipment safety procedures, Tank Explorer cleanliness and safety certifications were commenced to generate an extensive project plan including all safety procedures as well as necessary preparations were made before the Tank Explorer 500 was deployed in tank TK-0702 with naphtha. Therefore, the first main objective was completed successfully.

The second main objective was to perform an online tank bottom inspection. After the deployment, a significant sediment layer was detected. This sediment layer impeded the inspection and resulted in reduced coverage of the tank bottom to be inspected.



Smart tank terminal: robot inspection in Singapore

However, due to the Tank Explorer's strong hardware and well-trained crew, it was able to collect sufficient accurate and high quality online data to perform a corrosion assessment of the tank floor.

The obtained results were compared with data from an earlier offline floorscan inspection (required offline). Clear correlation could be demonstrated between the two different data sets. As such, deployment proved successful for both Intero and Vopak.



The Project

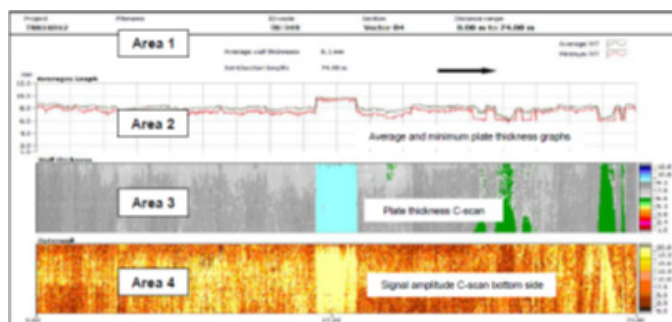
This online tank inspection was successfully executed in a timeframe of six days.

The Intero team spent two days rigging-up before actual deployment, ensuring that thorough preparation, testing of the safety systems, and calibration of the UT-system were completed.

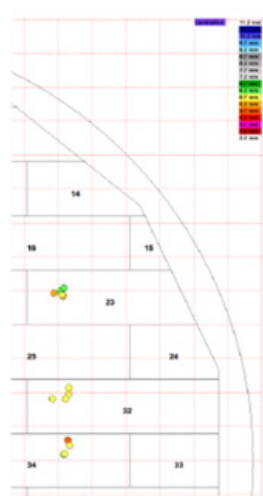
Despite the layer of sludge/scaling in the tank, enough data could be collected in four inspection days to perform an accurate integrity assessment of the tank bottom.

Conclusion

Once the data collection was finalized, data review for quality assurance and UT data analysis was performed. A summary of anomalies was reported including locations on the tank bottom and the remaining wall thicknesses.



All inspection operations were conducted in a safe and responsible manner, adhering to the health and safety policies of both the client and Intero Integrity Services. Both parties are very content with this first inspection, including the process as well as the results. Since its deployment in Singapore, Intero's R&D department made redesign improvements for future runs.



Advantages

- No downtime.
- No need for temporary storage.
- Save costs of cleaning the tank.
- Minimizes waste disposal costs.
- ATEX approved robot for safe zone 0 deployment.
- Reduce environmental risks such as spills and VOC release.
- Improvement of safety by eliminating confined space entry and personnel exposure to hazardous chemicals.
- No impact to customers of Vopak as the tank remains in service.