



Tank Services

In-Service Sludge Profiler, Sludge Removal & Inspection

Storage Tank Sludge Management

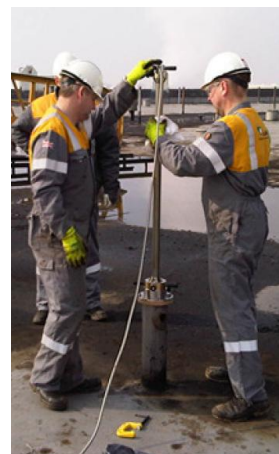
Crude oil transported and stored as the raw material for refinery processing has a propensity to separate into its heavier and lighter hydrocarbon components.

In vast above ground storage tanks (greater than 120m diameter) the heavier hydrocarbon components can create significant accumulations on the tank floor. These accumulations referred to as “Sludge” create several problems for storage tank operators:

- Reduces storage tank capacity
- Accelerates corrosion
- Disrupts maintenance operations
- Roof damage during landing

The sludge deposits consist of >90% recoverable hydrocarbons that are a valuable commodity that should be accounted for.

SA International Tank Services is now using a method of accurately measuring these tank sludge deposits and can offer a range of services from ad hoc surveys to complete sludge management.



Sludge Measurement

During a planned shutdown and maintenance cycle the tank roof legs have to be landed on the floor of the tank before manual cleaning or inspection can begin. Accurate knowledge of the sludge distribution and topology is important to ensure safe landing of the roof. A sludge survey prior to commencing any maintenance work ensures that the correct costs and budgets are applied to the work.

Online

A sludge survey can be completed with the tank online. The only requirement is to have the roof in a high position and any mixers switched off. This minimizes any disruption to plant operations.

When side entry mixers are installed in storage tanks then the resulting flow has an effect on the sludge distribution that can lead to significant accumulations. Online sludge profiling allows these mixer sludge patterns to be monitored

How it works:

The tank sludge profiler survey system is based on a precision acoustic sensor, capable of accurately scanning large sections of the tank floor. The received acoustic data is processed to calculate the sludge volume and generate 3D views of the sludge distribution.

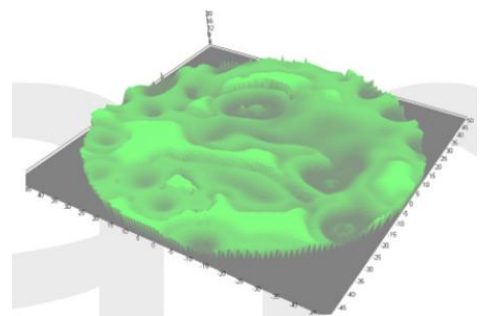
The acoustic sensor is an ATEX rated tool that is inserted into the stored oil through a suitable opening (.90mm) in the tank roof. It can be easily mobilized by a small team and a tank survey can be completed in very short time.

A sludge survey can be completed with the tank online. The only requirement is to have the roof in a high position and any mixers switched off.



Benefits:

- Speed
- Safety
 - no need to expose workers unnecessarily to inhalation risks
- Exact knowledge of sludge distribution
- Reduced errors
 - accurately mapping the sludge level and distribution means less chance of unknown build up points that could come into contact with roof supports that could cause roof failures
- Reduce unforeseen delays during shutdown
- Sludge management for effective tank operation
- Support cleaning operations
 - Quantify sludge level prior to contracting
 - Sludge topography known prior to positioning non-man entry jet cannons



Introduction:

The side-entry desludging systems utilized by SA International is an ATEX rated tool that is able to recover more than 95% of the hydrocarbons trapped in the sludge while the tank remains in operation. Conventional sludge removal techniques can leave thousands of barrels of sludge – and valuable hydrocarbons – in the tank. The old technology also creates health and safety risks for those performing the cleaning operations. But the greatest economic problem comes from taking your tank offline while the cleaning takes place.

How it works:

First, our Sludge profiler analyzes the amount, topography and composition of the sludge in your tank. Once the sludge is mapped out, a sophisticated set of valves is used to drill an opening in the tank through the blind flanges on the outer wall. A steerable jet cannon is introduced and used to stir the contents of the tank and to create a perfect circulation. The cannon uses a demulsifying product which separates hydrocarbons from water and sediments. It recirculates the product by applying high kinetic energy to break up paraffin and asphalt agglomerates.

Typically, the emulsion separates from the waste water, which we can pump out from below and remove for decontamination.

The tabs can be left for the next time the tank requires desludging.

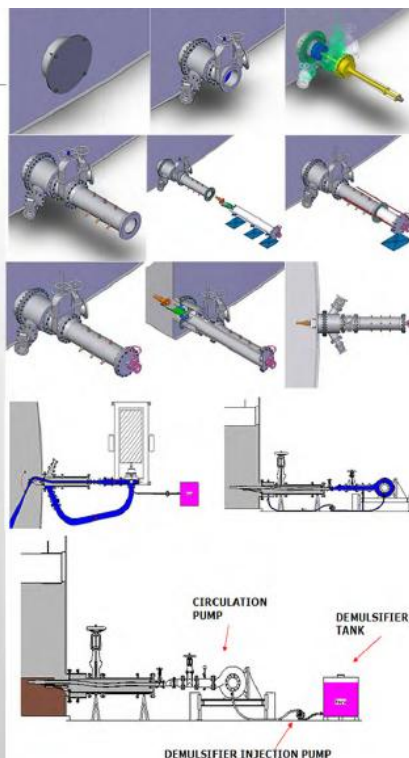
How does it work

Certifications

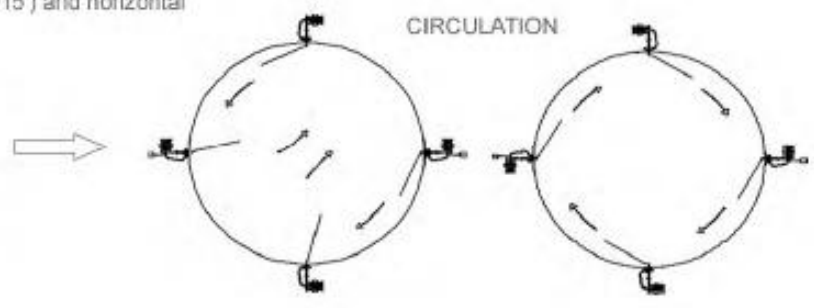
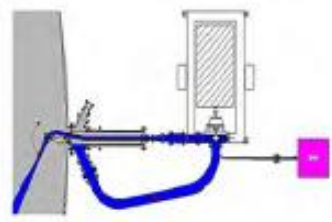
The process applies ATEX certified equipment (zone I)
The process applies CE certified equipment
It complies with API 650 rules.

Cleaning schedule

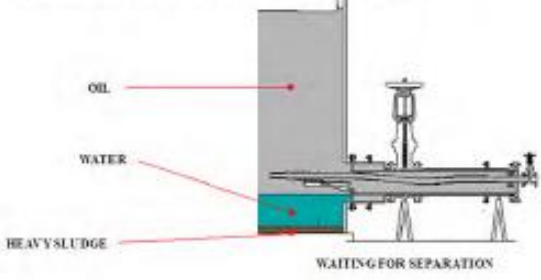
STEP 1: SLUDGE MEASUREMENT & SAMPLING
STEP 2: EQUIPMENT ASSEMBLING
STEP 3: COLD HOLE OPENING
STEP 4: CANNON INSERTION
STEP 5: CIRCULATION SYSTEM ASSEMBLING
STEP 6: CIRCULATION
STEP 7: PUMPING SYSTEM DISMOUNTING
STEP 8: OIL RECOVERING
STEP 9: CANNON REMOVAL
STEP 10: WATER PUMPING
STEP 11: DEGASING
STEP 12: FINAL WASHING
STEP 13: WASTE TREATMENT AND DISPOSAL



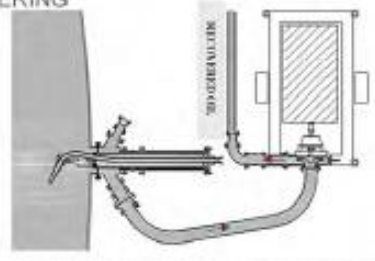
CIRCULATION SYSTEM ASSEMBLING
Cannon able to be oriented both on vertical (-45 , +15) and horizontal (+45 , -45) directions



SEDIMENTS-WATER-OIL SEPARATION

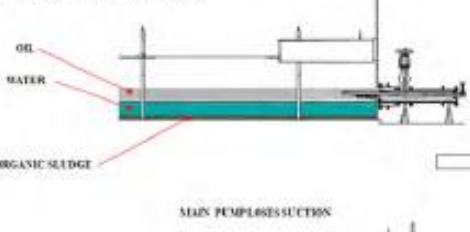


OIL RECOVERING

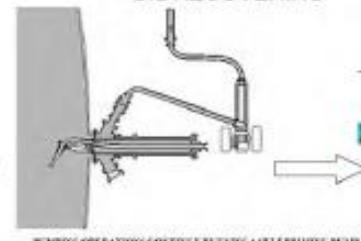


RECOVERED OIL PUMPED TO THE DESTINATION INDICATED BY TANK FARM MANAGEMENT.
OIL QUALITY CONTINUOUSLY MONITORED

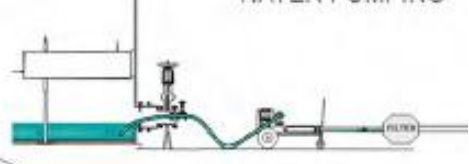
OIL RECOVERING



OIL RECOVERING



WATER PUMPING



FINAL WASHING AND CLEANING



Introduction:

The in-service tank bottom inspection is one of the latest services we offer our customers. This high technology tool performs the inspection of the tank bottom plate according to standard API 653 while the tank remains in operation.

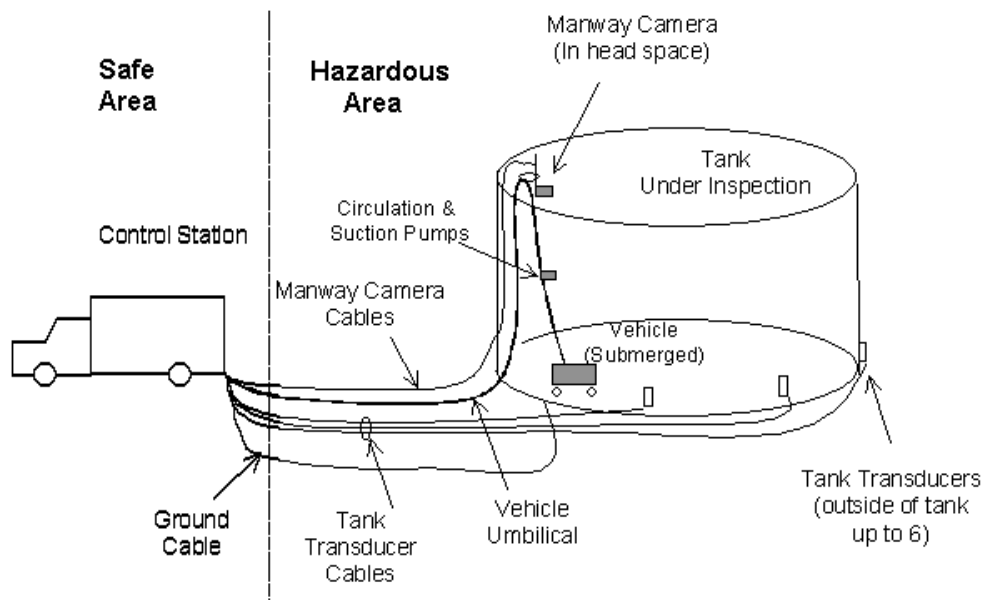


How it works:

Prior to the tank bottom inspection, we insert a video-camera system into the tank to determine the roof condition by visual inspection.

Then our robot, equipped with ultrasonic transducers, is inserted into the tank through a manhole on the tank roof. As soon as it reaches the bottom of the tank it starts the inspection, the sonar system helping it to navigate and to avoid obstacles like roof supports. The robot is connected with a number of transceivers which are attached outside around the tank to determine the exact location of the robot.

The robot is producing 200,000 up to 1,000,000 point readings, depending on the tank size. All results are directly transferred outside to the control unit for analysis and report generation.

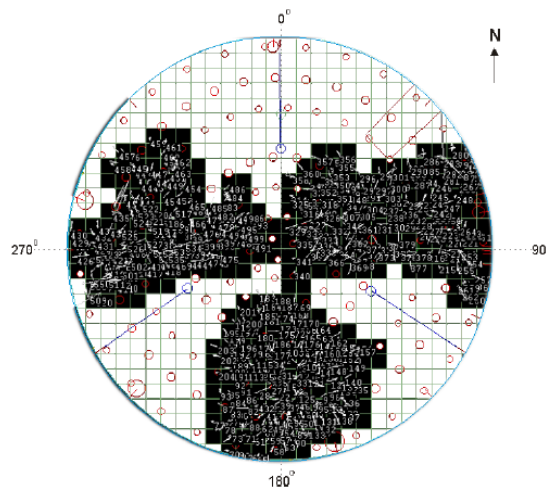


Reporting:

The robot produces accurate thickness measurements of the scanned areas which are provided to our clients in a detailed report.

Based on a worst-case scenario, the report gives an estimation of the remaining lifetime for the tank.

The robotic tank inspection results are accepted by the EGPC and insurance companies.



Benefits & Limitations:

The robotic tank inspection provides our clients with a wide range of benefits:

- No tank downtime, production loss
- No material transfer
- No alternate storage needed
- Speed
- Detailed information on bottom condition
- Reduced safety & environment risks
- Not affected by coating (incl. fiberglass)

Like any other technique, the robotic inspection also has its limitations:

- Only operable in liquids
- Not operating in rigid sludge



Inspection & Engineering Services

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