GEO OCEANS

SONOMATIC

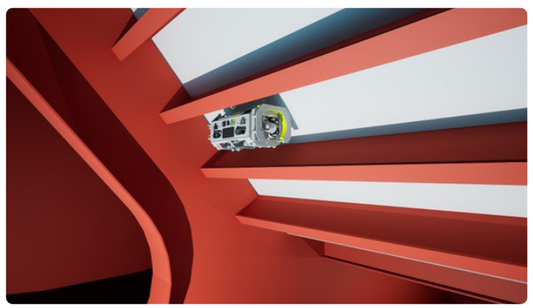
SUCCESS STORY

MAPPING FPSO CRUDE OIL/WATER BOUNDARIES

THE PURPOSE

This document is composed to assist our clients and the supply chain to better understand our capabilities and experience within the subsea NDT sector.

MAPPING CONDITIONS OF FPSO CRUDE OIL/ WATER BALLAST SHARED BOUNDARIES



Perth based Geo Oceans and sister company Sonomatic, have collaborated closely with a client's global robotics team since 2019 to develop a novel robotic technology – the i-COT ROV system - for performing in-service cargo oil tank inspections on FPSOs, tankers and marine vessels using robotic methods.

i-COT is seen not as one tool but as the delivery tool for a suite of un-manned and robotic Advanced NDT methods, each of which is selected specific to the inspection requirements of the tank.

In June 2023, Geo Oceans carried out the first implementation of the i-COT fitted with the Sonomatic Multiplexer UTM probe to take measurements from the water ballast tank walls shared with the crude oil tank on a FPSO based in the Gulf of Mexico to identify the condition of the plate.

PROJECT DESCRIPTION

The team were completing the required class inspections of selected water ballast tanks (WBT). Since the tanks would already be open, Geo Oceans requested the client to trial the use of the i-COT tool with an UTM point multiplexer fitted. This 'trial' grew to be a full scope of work.

This was truly an international collaboration, with Sonomatic in the UK working to get the UTM Multiplexer and other relevant pieces of equipment ready, whilst Geo Oceans in Australia worked on the i-COT tool and the client was based in America. The equipment was first trialled in the UK and then sent to the Geo Oceans workshop in Perth, for trials on a scaled mock-up of the structures to be scanned.

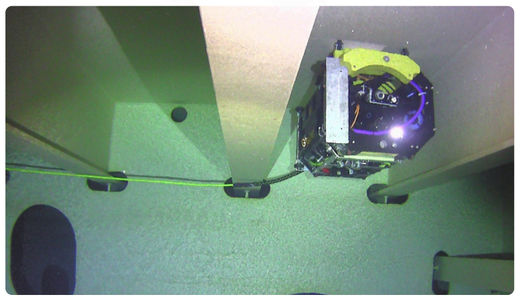
The inspection completed by the i-COT ROV is a first in many ways. It utilises inspection from the water ballast tank, which is relatively easy and has minimal effect on the operation of the facility, to capture as much information as possible relevant to the crude oil tank.

The inspection scope is defined from risk based inspection principles and experience. The scope also covers areas in the COT which cannot ordinarily be inspected during the internal inspection due to the presence of sediment or restrictions.

The scope was also determined using Non-Intrusive Inspection (NII) principles. NII is very well established in the inspection of pressure systems but has only had limited use to-date on the inspection of marine vessels or other tanks. Here the purpose was not to replace the internal inspection, but rather to minimise the time required to inspect the tank, prevent the need for manned entry and identify prior to entry any systemic issues which need planning for repair. NII methodology has been used to identify the final area of tank required to be inspected and will be used on receipt of the data to do further statistical analysis.

MAIN CHALLENGES

- The limited time available for final tool development and testing prior to implementation.
- Limited accurate information regarding the structural layout of the water ballast tank.
- Orientation of the boundary walls to be scanned, which required different bracketing for each orientation – horizontal, vertical and the hopper at 50°.
- Sizing of the hatch ways between stringers and some frames, and the presence of handrails and other obstructions around the opening.

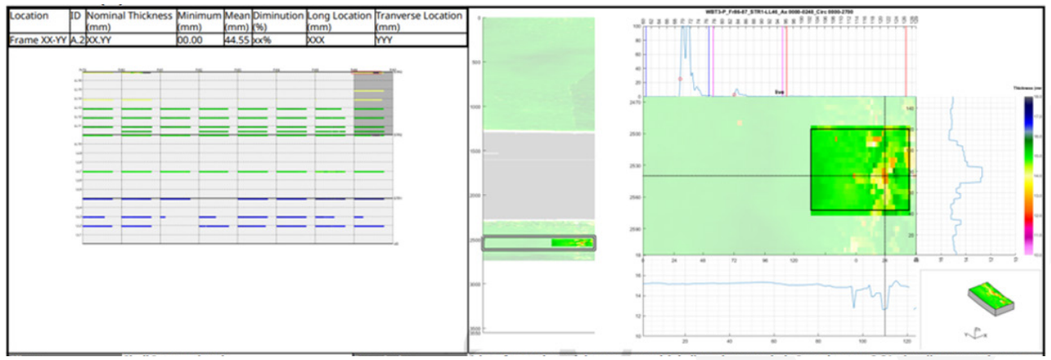


OUTCOME

The project proved that measurements can be taken from the WBT to give an insight into the condition of the COT; that areas which are not be visible via an internal inspection of the COT, such as areas on the bottom under sediment, can be measured from the WBT and that there is also the ability if required to use this technology to cost effectively monitor any areas of identified corrosion in the COT.

As an addition to this, readings were also able to be taken on the deck from the water ballast tank, giving accurate mapping of the corrosion present there. The deck is another area that is of high risk from corrosion and is often very difficult to measure due to the high usage and restricted access.

The success of the project lies in the proven ability to use the access to the COT provided by the WBT, existing non-destructive techniques and inspection methodologies to gain essential information regarding the COT without tank entry.



Location	ID	Nominal Thickness (mm)	Minimum (mm)	Mean (mm)	Diminution (%)	Long Location (mm)	Tranverse Location (mm)
Frame XX-YY	A.2	XX.YY	00.00	44.55	xx%	XXX	YYY

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