

Case Study

14 March 2013

Project: Non-intrusive inspection utilising Time of Flight Diffraction (TOFD) Screening, TOFD on welds, video tracked corrosion mapping, and Multiskip techniques on LP Separator as alternative to internal visual inspection in order to reduce shutdown requirements.

Problem: The main objective of any integrity management system is to provide assurance of the integrity of assets over the life of those assets. For pressure equipment, the primary objective is to identify and implement actions to avoid failure by leaks or rupture. A cost effective approach to integrity management is essential. This means aligning actions to risk levels. Effective decisions must therefore be based on understanding the risks which relies on a sound knowledge of equipment condition and how it may evolve over time.

Internal visual inspection (IVI) is widely accepted by Operators and Regulators as a means of acquiring data on the vessel condition but it requires the vessel to be shutdown. In addition to lost production, there are safety issues associated with man entry to vessels that must also be considered. Non-intrusive inspection (NII) offers an alternative that provides a robust process to investigate vessel condition, assure integrity, and justify IVI deferment or replacement.

An IVI was due to be carried out on an LP Separator during a platform shutdown (Figure 1). In order to reduce shutdown times, the vessel was assessed as being suitable for NII and several ultrasonic based techniques were chosen to inspect the regions of the vessel most susceptible to corrosion. Sonomatic carried out the NII inspection and the analysis of the results.

Figure 1: LP Separator

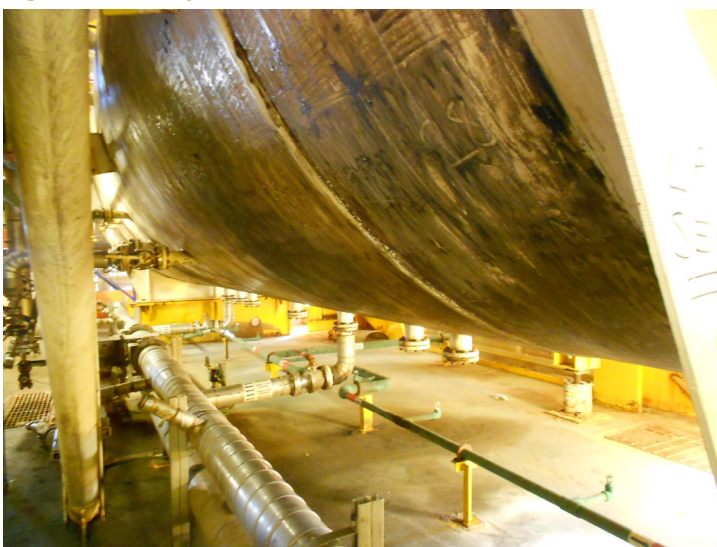
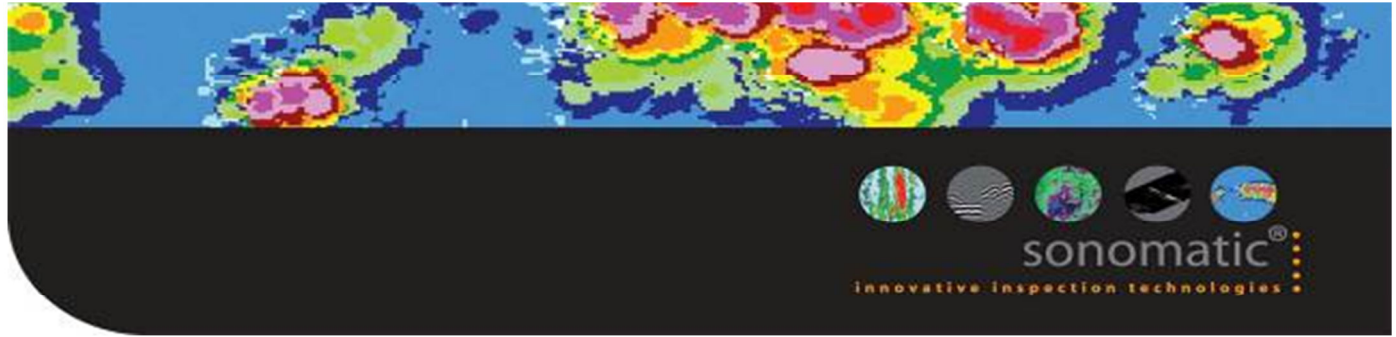


Figure 2: TOFD technique





Solution: TOFD Screening was used as the main technique, providing a rapid, high coverage inspection of the vessel shell and ends (Figure 2). This was supported by video tracked corrosion mapping for regions inaccessible for TOFD and Multiskip scanning for regions inaccessible due to supports.

The TOFD data was processed using Sonomatic's bespoke TOFD screening software which straightens data and finds lateral, compression and mode arrival times automatically (Figure 3, top). Over 3000 files were analysed and used to produce thickness profiles (Figure 3, bottom) which were then used to generate corrosion maps (Figure 4) allowing visual interpretation of the data. Statistical analysis was also performed on the data to determine if corrosion was present.

The probability of detection (POD) was found to be high for the inspection. Using the results of the inspection and evaluation, the Operator was able to make the case that the NII was a full replacement for IVI and was able to exclude the vessel from the planned shutdown work scope reducing the shut down by 10 days.

Figure 3: TOFD analysis

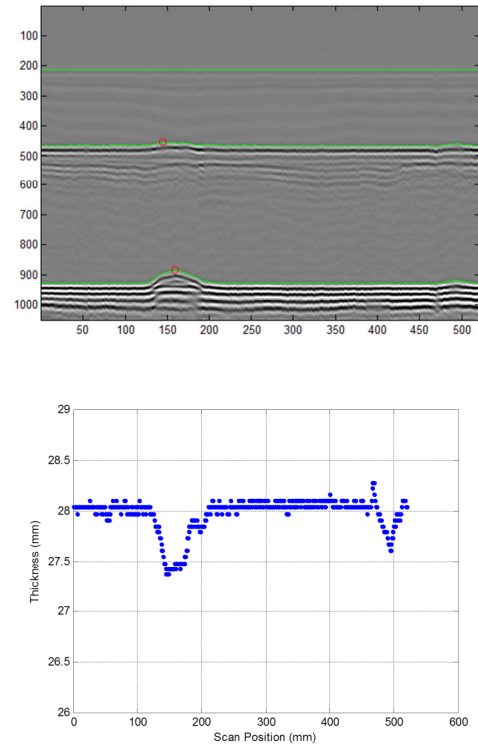
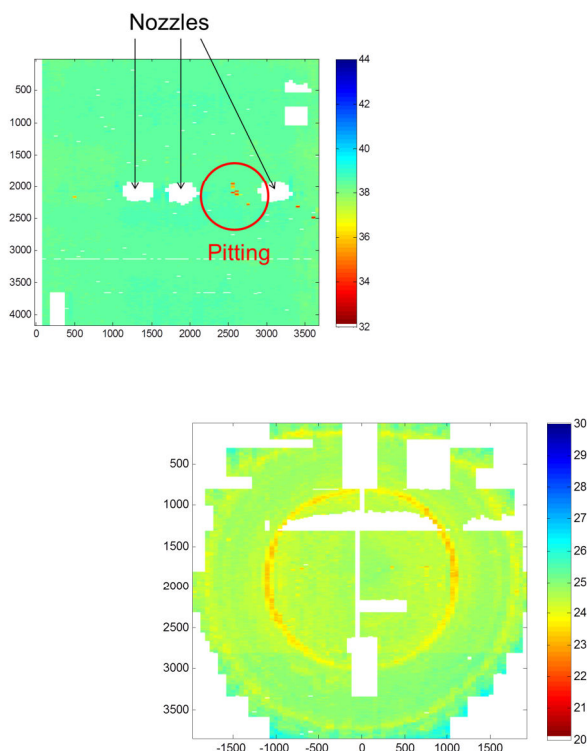


Figure 4: Example corrosion maps



Benefits: The NII inspection and data analysis services provided by Sonomatic allowed the Operator to exclude the LP Separator from the shutdown work scope. The benefits of the NII approach using the TOFD screening technique include:

- The technique provides a high POD for isolated, small diameter, defects
- Rapid coverage of large vessels
- Bespoke software allows rapid and reliable processing of large amounts of data
- Detailed corrosion maps from TOFD data
- NII results justified replacement of IVI
- Risks from entry to vessel removed
- Effective NII leads to significant reductions in shut down durations