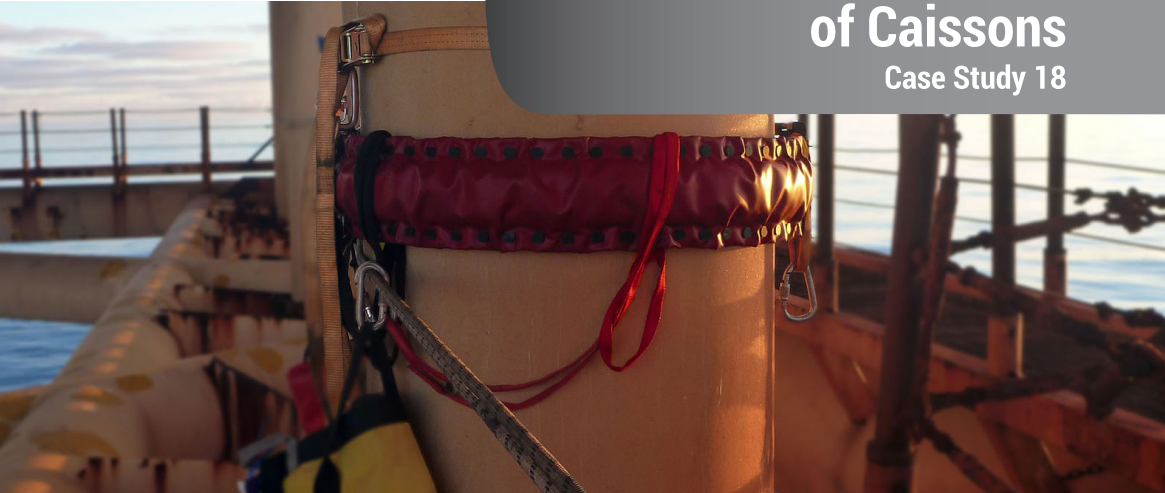


Guided Wave Inspection of Caissons

Case Study 18



Caissons

Pump caissons are used to bring sea water on to offshore platforms, either for water injection or as fire water.

There have been many instances where rapid corrosion in the caisson has resulted in complete failure and the lower portion of the caisson has collapsed to the sea floor. The fall of such a large object represents a significant risk to sea floor infrastructure, which in turn generates risk to the life of the people on the platform and can have a large environmental impact in the event of oil or gas release.

Equipment



Wavemaker® G4 Mini



Inflatable EFC Ring

GWT Inspection

GUL were asked to demonstrate the feasibility of using Guided Wave Testing (GWT) to inspect caissons on a North Sea offshore platform. Nine caissons were inspected over two days.

Ring installation was relatively easy through rope access, without requiring any prior cleaning. From one test location, GWT data covered the entire above water section plus 15-20m of the caisson below water.

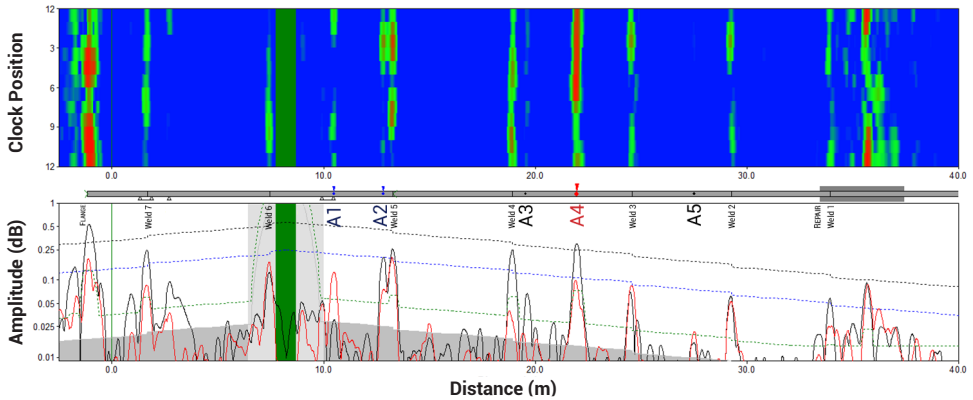
All caissons showed signs of metal loss. The two worst cases were selected for follow up inspection using internal UT equipment, which involved removal of the pump stacks and extensive water jetting to allow several passes of a tethered ultrasonic head that would measure wall loss.

Comparison of the guided wave results to the ultrasonic measurements showed that GWT is an efficient and effective tool to monitor offshore platform caissons, enabling the classification of problem areas before they become failures.

Caisson Inspection

Using Guided Wave Testing to monitor Caisson integrity

WavePro™ - GWT Results

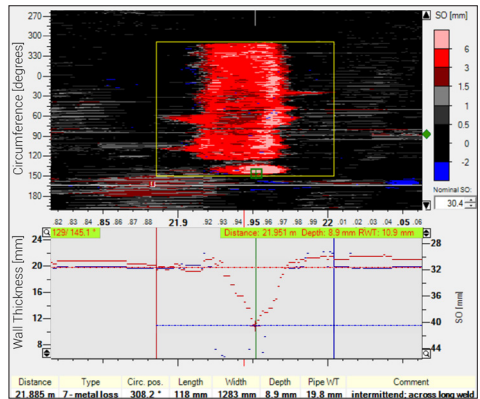


Proven Results

The Wavemaker® result from one of the inspected caissons is shown above. Several indications of metal loss were detected. The most severe - located just below the water line and labelled A4 - was estimated to be a 27% loss of pipe cross-section with around 50% wall loss.

The UT result at the location of A4 is shown in the image to the right. A measured total cross-section loss of 25% and wall loss of 45% at this location confirmed the Wavemaker® findings.

Other indications showed similar accuracy with defects being detected down to 3% CSA.



UT Result at the location of GWT Indication A4. Defect found at 21.88m from reference point, with 45% wall loss.

Comparison of GWT and UT Main Findings

Indication	GWT Location [m]	GWT CSA [%]	UT Location [m]	UT CSA [%]	Comments
A1	10.49	8	9.95 - 10.5	13.8	Defect at support.
A2	12.82	10	12.82	7.1	Internal wall loss.
A3	19.54	5	19.58	4.03	Internal wall loss.
A4	21.97	27	21.88	21.88	Primary reason for UT prove-up.
A5	27.50	2.1	27.49	2.15	Sum of multiple defects in close proximity.

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 2016CaseStudy18_rev0 Jan/2017

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