Offshore inspection using pulsed eddy current technology

Reduce the cost and improve the safety of inspecting steel risers, pipes and vessels

Benefits of offshore inspection with PEC technology

- No surface preparation – can measure through
  - marine growth
  - 20 mm of corrosion products
- No loss of production – in-service measurements
- Minimal use of divers – suitable for subsea inspections using remotely operated vehicles (ROV) to eliminate the cost and safety issues associated with using divers

PEC technology: a versatile tool

Above the splash zone, roped access enables PEC measurements to be taken quickly (Figure 1). Specially designed jigs fitted with a PEC probe can map wall thicknesses in the splash zone by moving round and up and down risers and caissons. Below the splash zone, with no need for surfaces to be cleaned or for direct contact with the steel, the PEC tool is suitable for use with ROVs (Figure 2). Equipment fitted to the ROV ensures that the PEC tool is correctly positioned, a task that was virtually impossible with the greater demands of ultrasonic inspection equipment.

Shell Global Solutions’ pulsed eddy current (PEC) technology can be used to measure the wall thickness of steel objects such as risers. Furthermore, these measurements can be made in-service, without contact with the metal surface and through marine growth, corrosion products and protective coatings. This means that PEC technology has major advantages over traditional inspection methods, which are comparatively slow, hazardous and expensive, and often require scaffolding, blast cleaning, and reapplication of protective coatings.

Figure 1: Roped workers making rapid PEC inspection of a riser.

Figure 2: An ROV fitted with PEC technology and a device that embraces the riser.
How PEC technology works

A PEC probe is placed by the wall that is to be inspected and an electric current is introduced in the transmitter coil, which magnetises the steel (Figure 3). When the current is switched off, the steel demagnetises. This sudden change in the magnetic field strength generates eddy currents in the steel, which diffuse inwards from the steel surface, decaying in strength as they do so. These decaying eddy currents induce a field that is detected by receiver coils in the PEC probe. The signal detected is directly related to wall thickness.

The PEC tool obtains a measure of wall thickness by taking an average reading over the probe’s footprint (the roughly circular area where eddy currents flow). This makes it ideal for measuring general wall loss.

An example of the wall thickness data acquired using an ROV, and indicating a band with severe wall loss (red).

“We use a PEC tool to measure the wall thickness of risers where they are most susceptible to corrosion – in the splash zone. Roped workers using a PEC tool mounted on a pole quickly collect the data, which are then downloaded and analysed by Shell Global Solutions. We get a report detailing actual wall thickness loss. PEC is an invaluable tool”

Senior inspection engineer, Shell Expro

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