CASE STUDY

Phased Array Ultrasonics (PAUT) inspection of crane motor armature shafts

ASSET Jack-up drilling rigs
LOCATION UK and Norway

When conventional inspection methods are not possible, utilising specialists to provide a bespoke solution can save a lot of time and unnecessary costs

BENEFITS

Permanent record of test data logged

Reduced manual handling risks

Crane down time significantly reduced

Significant reductions to manpower and equipment required for inspection

Inspection carried out in-situ with only minimal support from deck crew

CHALLENGE

Our inspection team were asked by the customer to provide a fully comprehensive inspection of N9/N11 crane motor armature shafts.

In order to carry out conventional Non-Destructive Testing (NDT) on these types of shafts they would have required the removal of the pin to allow the full body of the pin exposed for conventional NDT. This would have been a time consuming process that would have required:

- Scaffolding for access
- Rigging for removal of shafts / pins
- Multiple personnel to dismantle components / pull shafts
- The cleaning and inspection of shafts using conventional NDT (Magnetic Particle Inspection (MPI) or Dye Penetrant Inspection (DPI))
- The requirement for a function / load test after shaft replacement
- Increased manual handling risks.

In addition to this, using conventional NDT methods limits access during inspection due to the geometry / orientation of the component, meaning the internal areas of the crane armature shafts cannot be fully inspected.

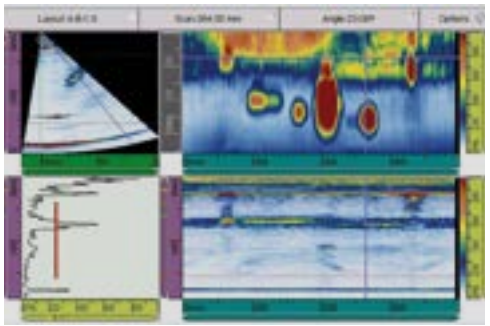
SOLUTION

- Our specialists concluded that a PAUT inspection would provide a suitable comprehensive inspection of the shafts while also being relatively non-intrusive. Single-element probes from NDT emit a beam in a single fixed direction, whereas the beam from a phased array probe can be moved electronically and can be swept through a wide volume of material at high speed
- There are many factors to consider when testing elongated narrow samples such as these shafts and it is crucial to be able to understand what happens to the spreading beam as it reflects from the sides within the component. Due to the nature of ultrasonic testing, 'spurious signals' or 'non relevant indications' may appear to show a flaw within the material, but are in fact negligible
- To ensure the signal was relevant a test was carried out on an identical fabricated sample with no flaws to determine what each signal was being reflected from so they were eliminated when doing the data interpretation
- Flaws were then added to the sample in the form of surface notches and the equipment optimised to detect these targets (early stage fatigue cracks will have only a low amplitude response)
- The PAUT was then carried out offshore, showing that the pins were fit for use and no change out was required
- The total time for the offshore scanning and reporting aspects was two hours
- If the PAUT equipment permits the data to be recorded, a retest at a later date allows the two data files to be compared increasing the probability of detecting very early stage cracks due to a change in screen presentation pattern.

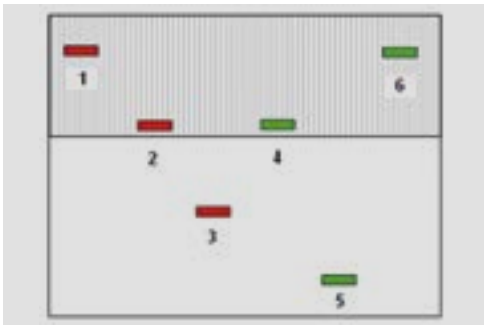
SUMMARY

- Supply of PCN level 2 phased array technician
- Supply of phased array set (including specialised probe)
- Creation of N9 / N11 phased array inspection procedure
- Creation of inspection technique sheet
- Manufacturing of defects in test piece

1.



2.



3.

1. Pin scanning results

2. Test sample induced defects

3. Olympus Omniscan

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