

Rapid Surface Inspection of Butt Welds Using Next Generation ACFM Array Probes

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Heavy walled vessels, pipework and structures require the periodic inspection of wide butt welds for the detection and categorisation of surface-breaking cracks caused by in-service stresses around the weld. Conventional surface inspection techniques require the removal of paint and coating which adds cost, time and generates waste. In addition, they can only assess cracks' surface length and not cracks' depth, which is the more critical dimension in determining the severity of a defect for structural integrity. In the past, Alternating Current Field Measurement (ACFM®) has proved to be an effective alternative method for detecting and sizing cracks, without the need to remove coatings or paint, and for giving a determination of crack depth usually without the need for on-site calibration. However, the probe's sensor area has typically been small, which requires several passes of the probe on a wide weld cap. Multi-sensor arrays have existed, but the scan speed has been low due to restrictions with the instrumentation. A new generation of ACFM instrumentation, featuring substantially faster and higher resolution data, has enabled the development of larger sensor arrays that can be deployed at a speed much more conducive to effective and productive inspections. One such array is considered here which features 16 compliant fingers covering a width of 90 mm (3.54 in). This can inspect wide butt welds with cap heights up to 10 mm (0.39 in) for defects in both longitudinal and transverse orientations in one pass of the probe. Data will also be presented which demonstrates the detection thresholds through various thicknesses of coating. Keywords ACFM, butt welds, crack detection, NDT