

QualiTi

Development of a new and novel quality control system for the inspection of titanium components in safety critical applications in the Aerospace industry

- Project budget: £1.2m
- End Users: TIMET

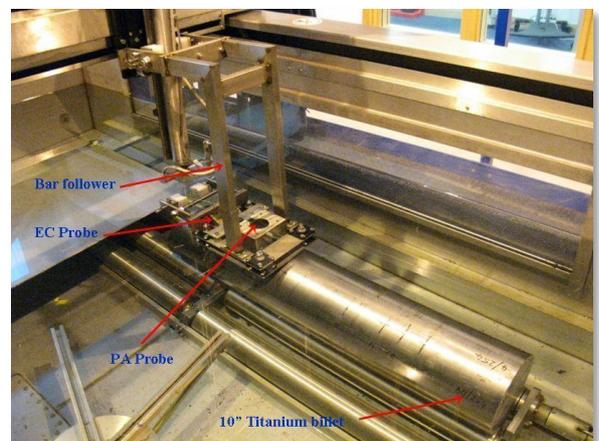


Titanium is widely used in the manufacture of safety critical components for the aerospace industry. The difficulty related to the automated inspection of a Titanium billet is due to its coarse grain structure, which causes attenuation of the energy as ultrasonic waves are scattered by the grains during propagation. The flaws to be detected are typically less than 1mm in diameter and at depths of up to 150mm.

A new and novel automated phased-array (PA) ultrasonic system integrated with a multicoil eddy-current (EC) probe has been developed for the inspection of titanium billet at the raw material

manufacturing stage. Ultrasonic inspection within 5mm of the top surface is hampered by the 'dead-zones', where the interface signal from the surface can mask flaws. To address this, a multicoil eddy-current probe is being integrated into the system, which includes the inspection of this area.

The novel PA ultrasonic probe was designed and simulated with the objective of enabling electronic beam steering and focussing to compensate for misalignment of the probe due to variations in billet geometry and flaw orientation. The probe consists of up to 255 elements and enables focal spot sizes of less than 2.5mm to be maintained at all depths.



The EC probe implements a novel configuration of five coils which, when working in combination, can detect defects in any orientation. Combining the PA and EC inspection techniques in tandem should therefore help to attain 100% inspection coverage of the titanium billet.

QualiTi is a collaboration between the following organisations: TWI NDT Validation Centre, Wales; West Pomeranian University of Technology, Poland; TIMET, UK; Vermon SA, France; Tecnitest Ingenieros S.L., Spain; and I.SO.Test Engineering s.r.l, Italy. The project is co-ordinated and managed by TWI Ltd and is partly funded by the European Commission under the Research for the Benefit of Specific Groups Project ref: FP7-SME-2007-1-GA-222476.

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