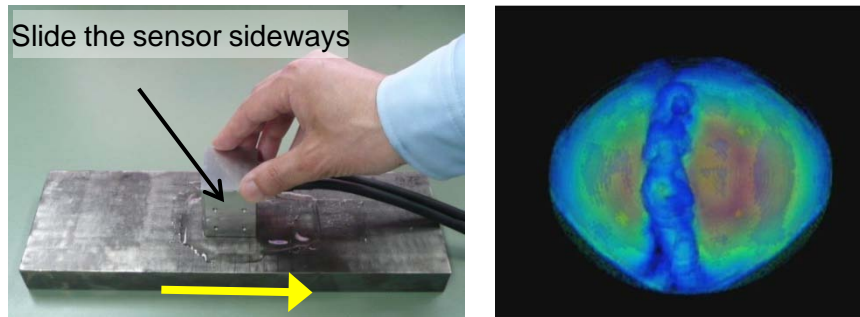


Ultrasonic testing technique for real-time 3D imaging of the defects within metals



Tracing stress corrosion crack in a metal sample

(Left: Nickel based alloy, plate thickness 23 mm, Right: Image displayed)

Ultrasonic testing technology has been developed which allows the internal condition of industrial metallic material to be checked in 3D in real-time without having to cut the material.

The technology developed enables the condition of a metal to be observed in 3D at a speed of 5 frames per second using ultrasound. This is approximately 50 times faster than conventional methods. As a result, it is possible to observe in real-time the internal conditions by sliding a sensor over the metal surface.

■ Features of the technology developed

- (1) 3D display is obtained by emitting up to a maximum of 4,096 ultrasonic beams generated by oscillating 256 elements at once. The spatial resolution of approximately 0.05mm allows the inspection of even fine cracks.
- (2) The propagation path of ultrasonic waves, (ray tracing analysis) can be calculated based on data from 3D-CAD (3D computer-aided-design) allowing pre-inspection setting to be easily set, thus reducing inspection time.

■ Future directions

Application of this technology to maintenance and inspection of metal materials used in power plants and railways will increase inspection accuracy and work efficiency.

■ A word from the development team

IT is possible to inspect a plate with the dimensions of 10cm (w) x 10cm (l) x 20cm (d) in one go, detecting damage as small as 0.5mm. We are hoping to apply this testing technique to the assessment of various materials such as metals and plastics.