

Vastly improved resolution and sensitivity using phased array technologies for air coupled ultrasound

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To obtain the best possible results in air coupled ultrasonic testing, it is always necessary to find a compromise between the attenuation of the material and the achievable axial and lateral resolution. In many applications, the high attenuation of the test sample means inspection is only possible with very low transducer frequencies, leading to poor resolution. In these cases, a higher frequency would be unable to penetrate through the material, resulting in a stark reduction in sensitivity. This presentation aims to provide an insight into the broad range of new possibilities obtained through the use of phased array technology in air coupled ultrasonic transmission. A systematic analysis of the association between the relative phase shift of the single elements and the resulting sound field is performed and presented along with the corresponding test images. In addition to the observation of the sound fields that result from the superposition of multiple elements, the behaviour and properties of the sound fields produced by each single element individually are also considered. The advantages and disadvantages of both phased array and standard air coupled ultrasonic testing technologies are illustrated through comparative measurements made on real test samples with both single and multi-element 400kHz transducers .