

Challenging Applications for Air Coupled Ultrasonic Inspections

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Ultrasonic inspections of large composite components are usually carried out with squirter technique. However, a water coupling delivers disadvantages like pressure variations, air-bubbles, lime scales, algae and corrosion of the mechanics or just wetting the test specimen. Therefore, a non-contact air-coupled technique is preferable to avoid these disadvantages. However, an air-coupled inspection places high demands on technology. A large acoustic mismatch between solids and air cause losses of 160 dB and more. Only frequencies below 1 MHz can be used due to a high damping of air. The demands are fulfilled with special transducers, a powerful excitation as well as a hard- and software signal processing. The testing is usually carried out in transmission technique with separate transducers on opposite sides of the component. The applications are mostly located in area of aerospace components such as foam, CFRP or sandwich components. With new developments like eight channel systems the scanning time can be reduced to 5 min/m². An ultra-low noise amplifier (ULNA) provides a 4 dB lower RMS value of noise than former types. A further area of development is the ACU with one side access. Typical advantages of this technique is the reduction of scanning system complexity and the possibility to test hard accessible build-in components.