

ACOUSTICS2008/847
Ultrasonic polar c-scan system for range of material sizes and its capabilities for non-destructive testing

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The principle of multi-directional incident ultrasound has already shown to be a promising technique for the nondestructive evaluation of composites and other materials. The advantage is the correspondence between stiffness, damage and the registered double through transmission patterns. C-scans are widely used as a tool for the detection of defects in materials. A new ultrasonic scanner has been developed, called the Polar C-Scan, which enables efficient polar scan measurements in combination with C-scan capabilities. The scanner opens many possibilities for nondestructive testing by means of polar scans, C-scans, single transmission, double through transmission and even reflection. Furthermore the system produces almost no noise, which enables highly sensitive measurements in the time domain and the frequency domain. The presented work shows a thorough investigation of all the capabilities of the system and presents results for fiber reinforced composites after different fatigue cycles.