



Composite Impact & Porosity Characterization with Pocket UT™

Introduction

Small area impact damage is a big concern for most aerospace and aircraft manufacturers throughout the world. The size and severity of the damage must be known and assessed before repairs can commence. Most inspections are accomplished using conventional flaw detectors that do not record the ultrasonic information or size of the area of interest. There is a need for inspectors to provide as much data as possible to the engineers for analysis. NDT Automation (NDTA), a member of MISTRAS Products & Systems Division, has developed an instrument to supply inspectors with the tools necessary to not only find damage, but also size and document the damage using the *Pocket UT™*.



*Composite Inspection Performed with
Pocket UT™ and X-Y Scanner*



***Pocket UT™: Hand-Held
Ultrasonic Full C-Scan System***

Pocket UT™

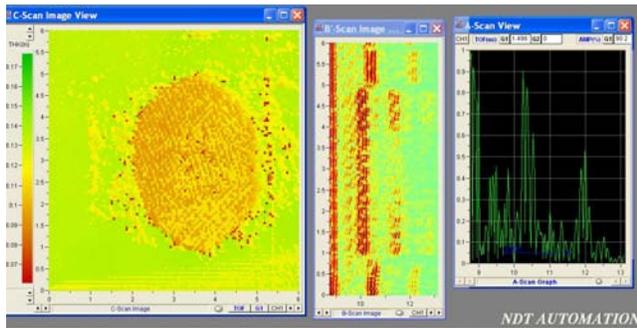
The Pocket UT™ is an innovative hand-held, battery powered C-scan system which can map the damaged area using manual or motorized X-Y scanners. The system runs on Windows CE™ and Pocket UT Win™ for data acquisition, analysis, and archiving. It also has the capability to perform A, B, and C-scans, placing the unit in a class by itself. The inner workings of the two pound instrument includes a 20MHz bandwidth amplifier and a 1kHz pulser/receiver board that is powered by a 7.2V NiMH battery giving the instrument 4 hours of continuous use. Thickness, amplitude and waveform data is stored on a 1 Gb (or higher) compact flash card, that can be transferred to a laptop computer using the USB port.

The Pocket UT™ can interface with 2 axes of motion, whether motorized or manual. The open architecture allows the instrument to interface with any 2 axis encoded scanner or to control stepper motor scanners. Resolution is limited only by the scanner, with typical scans taken at .020".

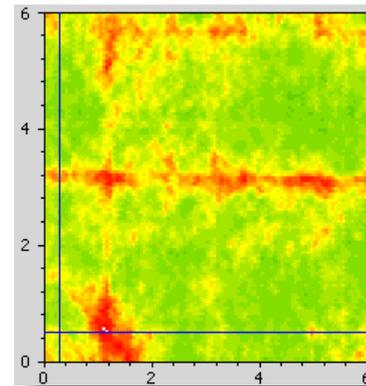
Inspection Examples with Pocket UT™

Several inspections were performed for two different aerospace applications, impact damage and porosity. The impact damage was in an area of a composite fuselage approximately 10" x 10". The area was scanned with a manual X-Y scanner with resolution set at .150". The minimum damage area was established to be .500". The specification stated that a minimum damaged area of interest must be seen in three consecutive scan lines. The results were gathered and displayed in a C-scan plot within a few minutes. The same test using conventional means would have taken several hours.

The second inspection was to find areas of porosity that caused a significant loss of the back wall of the ultrasonic signal. This condition causes the area to be very weak. The test was performed using an automated X-Y scanner at .050" resolution. The resulting C-scan displayed the areas of porosity very easily and repairs were scheduled.



Delamination can be seen clearly in both the C-Scan and B-Scan.



This C-Scan shows a large amount of porosity in red

NDT Automation Solution

Inspections are currently being performed at manufacturers and service centers around the world. The Pocket UT™ allows inspectors to gather and evaluate ultrasonic images so identifying areas to be repaired can be completed in a fraction of the time compared to the current methods.

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