



APPLICATION NOTE

Detecting Voids & Delaminations in Carbon Fiber Composite Materials

Challenge

Many companies, most notably those in the aerospace and defense industries, have turned to carbon fiber reinforced plastic (CFRP) and other composite materials. These materials are very strong and very light, thus increasing aircraft range and reducing fuel consumption. However, there is no reliable in-service inspection method that quickly and easily detects composite material damage while also providing all the standard quantitative information that Non-Destructive Testing (NDT) technicians expect. Most reliable tools available today are time consuming and complicated, involving long set-up procedures. The aerospace industry needs to make efficient use of its trained inspectors and a tool that will help get these composite aircraft back up in the air quickly after in-service or production damage occurs.

Solution



The Acoustocam™ by Imperium solves this challenge by providing instant, high resolution video images of subsurface composite damage without sacrificing quantification data. To use the system, an inspector quickly calibrates the system and scans over a suspected area of damage, while real time C-scan and A-scan data is generated. The total time to setup, calibrate, and scan a 12" x 12" area is under 4 minutes. The system requires minimal training. The result is an enhanced user experience, faster turnaround time, and increased aircraft uptime. This efficient use of resources permits more comprehensive data driven inspections to be completed each day. Inspections can be monitored in person or wirelessly in real time for remote collaboration with other personnel.

Acoustocam™ i600

Benefits:

- ✓ Increase aircraft uptime
- ✓ Decrease total cost of asset ownership
- ✓ Quick diagnosis of damage
- ✓ Comprehensive quantitative information
- ✓ Fast to set up and calibrate
- ✓ Easy to understand, easy to operate
- ✓ Reduce training costs

Boeing Finalizes Acoustocam™ NDT Procedure for 787 Dreamliner

What: In-service procedure to inspect various structures on the 787's carbon fiber-composite airframe.

Title: Inspection of BMS 8-276 Solid Laminate Fuselage Structures for Damage (Ultrasonic Camera).

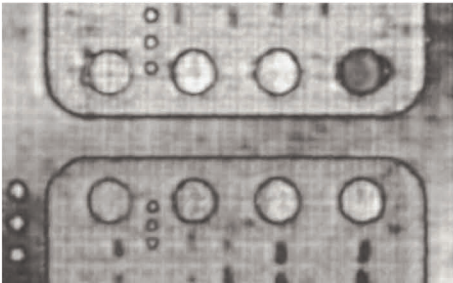
Where: Boeing's 787 NDT Manual (Part 04, 51-00-19)

Authorized Device: Acoustocam™

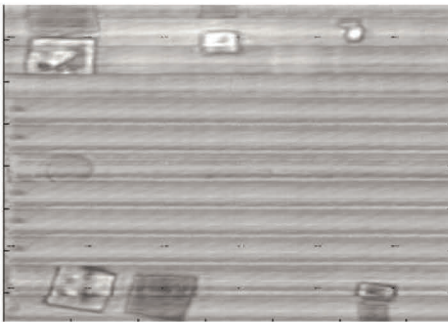
Acoustocam™ Features

Powered by Imperium's patented Digital Acoustic Video (DAV™) technology, the Acoustocam™ is the NDT industry's easiest and fastest portable imaging device. It captures thickness readings and high-resolution ultrasound C-scan images at 30 frames per second. Pictured below are several results of ultrasound C-scan images of carbon fiber composite panels. Thickness readings with A-scan data is presented below.

Graphite Epoxy with Steps & Holes



Solid Laminate with Inserts

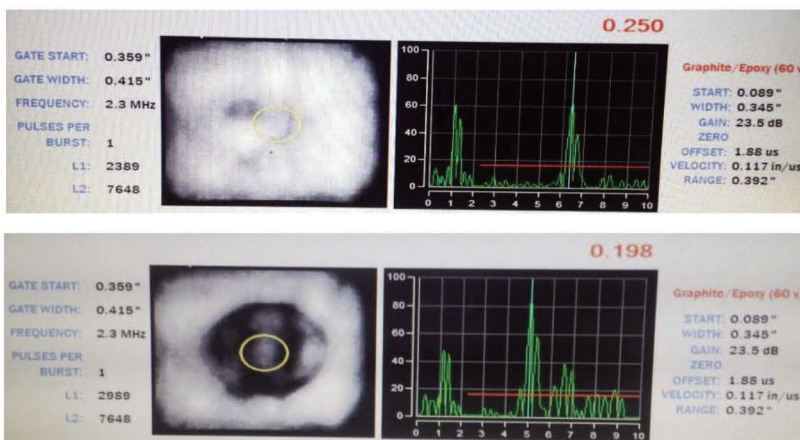


Acoustocam™ Features

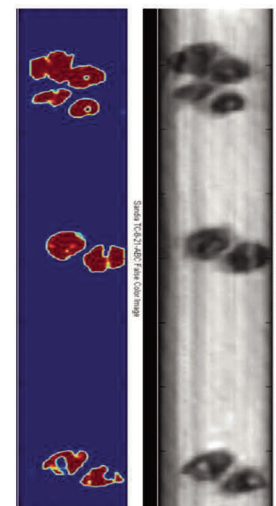
- Set up, calibrate, scan large area under 4 minutes
- 100% A-scan coverage, storage & analysis
- Rugged, battery powered design
- Compliant with ASTM E317
- Color & gray scale palettes
- User friendly touchscreen interface
- Flat or curved surfaces
- Built in delay line ideal for near surface defects up to several inches thick
- Sub-millimeter resolution
- Wireless remote monitoring connectivity
- Training under 2 days

Carbon-Fiber Composite with Impact Damage

C-scans and A-scans of Clean and Damaged Areas



False Color Gray Scale



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