

IMPERIUM™ APPLICATION BRIEF

February 2008

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System I500PE

Pulse-Echo Configuration
Software V1.0.14
Firmware V3.16
DLL V5.3

System Settings:

Frequency @ 4.0MHz
Incident Angle @ 0°
Pulser @ 1 Pulse/Burst
Material: Composite Fiber
Velocity Value: 0.117 in/μs

ACOUSTOCAM™ Software INITIAL SETUP

C-Scan Parameters:

Gate Start 4.65μs
Gate Width 11.79μs
L1 Grey Scale: 4371
L2 Grey Scale: 7324
Brightness 50% Level
Contrast Near 90%

A-Scan Parameters:

Gain: 30.1dB
Full Rectification
Gate Start 0.09μs
Gate Width 0.39"
Range: 0.44"
Zero Offset: 14.00μs

Key Features:

Portable platform
Integrated C-scan and A-scan
Adjustable Angle Beam
LCD Camera
Pentium M: 1.6Gb
Embedded MS-Windows®
Touch-screen GUI
512Mb RAM
2Gb Hard Drive
(2) USB Ports V2.0
(1) 100BaseT Ethernet Port
(1) Mini-PCI 802.11g
Wi-Fi with Antenna

Next Steps:

Please visit the corporate website at www.imperiuminc.com or contact us at:

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Office: 1 (301) 431-2905

Ask for a sales representative

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This Report

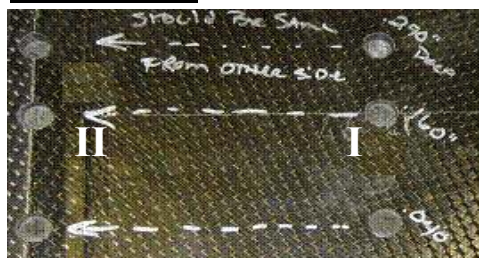
This application brief examines the use of the Imperium I500 Acoustocam Ultrasound system for Non-Destructive Testing (“NDT”) of a sample of carbon fiber composite material. The purpose of this application brief is to document the effectiveness and potential suitability of the I500 for NDT on the type of material utilized in this test. Results may vary and the reader is advised to utilize this report for information-purposes only.

ABOUT THIS TEST SAMPLE: This composite panel has the dimensions of 26 inches (width) by 7 inches (length) with varying thickness from 1 3/8” to 3/8” thickness. The sample was provided by a leading worldwide aerospace manufacturer.



The I500 is packaged in the portable Pulse-Echo configuration. The initial settings and features for the system are noted in the side-bar to the left of this page. Illustrated below are the defects that can be seen from the back of the composite panel. Each area with a defect is noted with a Roman Numeral for reference purposes.

Defects I and II



Inspection Procedures

Including the initial setup of the parameters, the duration of the test is approximately 15 minutes. *The settings are stored in the system and subsequent testing of this or similar samples should be less than 3 minutes on average.* Setup time included the determination of the appropriate frequency, pulses per burst, gate start and width, identifying the material, and grey scale and contrast settings. The range gating feature allows the examiner to view the material at various depths in real time, i.e. 30 frames per second. Separate sets of parameters are provided for C-scan and A-scan. The actual ultrasonic images are 1” by 1”. The systems displays on a viewing screen a 2.25” by 2.25” view with a list of key display readings. Couplant was placed on test sample and the ultrasonic camera then placed on top as illustrated in the picture to the left.

The Results



In the C-scan video image above note the crosshairs in the middle of the C-scan. At that point, a full waveform is presented on the right hand side. This waveform and associated functionality is identical to a standard commercial flaw detector. On the A-scan, the red line represents a gate. The thickness measurement shown in red above the C-scan represents the crossing of the A-scan gate.

Below is an analysis of Defects I and II with 6 illustrative screen shots saved on the I500 using Acoustocam software. The images may be downloaded either over an Ethernet connection, via a USB memory stick or even through a wireless connection to any host.

Summary on Defects I

(in Inches)

	<u>Bottom</u>	<u>Middle</u>	<u>Top</u>
Sample Thickness	0.483	0.483	0.483
Distance to Hole	<u>0.040</u>	<u>0.160</u>	<u>0.290</u>
Estimated Hole Depth	0.443	0.323	0.193
Observed Hole Depth	0.426	0.325	0.190

Summary on Defects II

(in inches)

	<u>Bottom</u>	<u>Middle</u>	<u>Top</u>
Sample Thickness	0.372	0.372	0.372
Distance to Hole	<u>0.040</u>	<u>0.160</u>	<u>0.290</u>
Estimated Hole Depth	0.332	0.212	0.082
Observed Hole Depth	0.332	0.227	0.091

