

IMPERIUM™ APPLICATION BRIEF

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ACOUSTOCAM™ SETUP

SYSTEM I500

Pulse-Echo
Configuration
Software V1.0.3
Firmware V3.13

System Settings:

Frequency @ 2.3MHz
Pulser 5 PPB
Shearwave @ 45°
Gate Start 0.11µs
Gate Width 24.25 µs
Material I.D. Steel 4340
or Carbon Steel
Velocity Value: 0.230
Gate Start: Zero
Offset: 0.230
A-Scan Presentation: Full
Rectification
Thread Delay at 250
Received Data: Interface
DLL V5.1
Brightness 1/3 Level
Contrast Near 100%
L1 Grey Scale: 5104
L2 Grey Scale: 6337

Key Features:

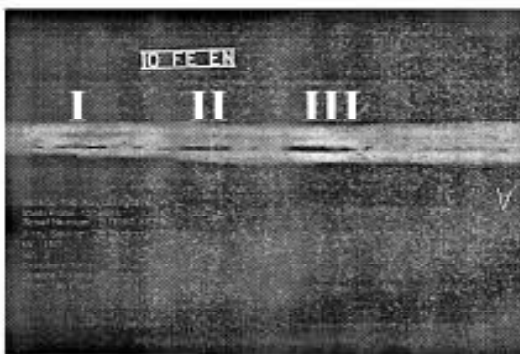
Portable platform
Integrated C-scan and A-
scan
Adjustable Angle Beam
Integrated LCD Camera
Pentium M: 1.6 Gb
Embedded MS-
Windows®
Acoustocam Software:
touch-screen GUI
512Mb RAM
2Gb Hard Drive
(2) USB Ports V2.0
(1) 10BaseT En Port

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 steel plates to inspect of defaults due to lack of weld fusion, chaplets of porosities or ramified cracks. 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 plate butt-welded material of **carbon steel** has the dimensions of 295mm (width) by 348mm (length) by 15mm (thick). The sample identified by the provider as TUT360812. The provider is the **French Institut de Soudure Industrie / IS Industrie, CND développement / NDT development.**

TUT 360812



The image above is an X-ray using a GE Erasco system using 150kV/3mA and an exposure time of 1.8 seconds. Note that there appears to be at least three locations of defects in the X-ray, along the horizontal image where the welding was performed. They are Roman numeral identified.

The following illustration is the Imperium test environment for the test sample. The I500 is packaged in the portable Pulse-Echo configuration for this test. The settings and features for the system are noted in the side-bar to the left of this page. Key settings are the frequency set at 2.3MHz, 5 Pulses per Burst and the Shearwave Angle at 45 degrees.



Inspection Procedures

Including the initial setup of the parameters/settings, the duration of the test is approximately 15 minutes. The settings are stored in the system and subsequent testing to confirm the results took less than 3 minutes on average. The initial 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. Being that the system is portable this type of testing could conceivably be performed anywhere. The test procedure used a camera or incident angle of 18°; which translates to a 45° shearwave to view inside the crown of the weld from an angle. The range gating feature allows the examiner to view the material at various depths in real time, i.e. 30 frames per second. For this inspection the front of the gate is set at 0.11µs and the gate width is set at 24.25µs. 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. The camera was placed just below the weld crown of the test sample setup in the position as illustrated in the previous picture. The reason for this is that no defects were observable from the top half of the test sample.

The Results

Illustrated below are three still-video captures that appear to identify the three defective areas noted on the copy of the X-ray above. These images were captured by the Acoustocam software and may be downloaded either over a 10BaseT connection, via a memory stick or even through a wireless connection to any host with a windows-based application for editing and display in this report.

Illustration of "I"

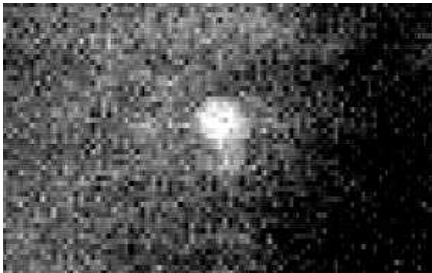


Illustration of "II"



Illustration of "III"



Note that there is a double image in Illustration III. This is purposely presented to note that in shearwave inspection procedures, multiple "bounces" of the image may be reflected back to the camera causing multiple images of the same defect. This might be eliminated or reduced somewhat by adjusting the Gate Range.

A second item to note is rather self-evident. The larger the apparent defect the brighter the appearance.

By adjusting the brightness, contrast and grey-scale, the user is able to filter or edit the video picture to personal preference to highlight how bright and sharp the image is.

The actual video images will be placed on Imperium's web-site for viewing at a later date. ❄

About Acoustocam

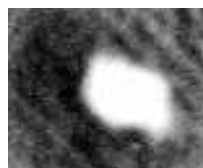
Imperium offers a hand-held, portable solution and a Thru-Transmission solution that use the company's proprietary digital Acoustic Video (AV™) technology in a range of industrial/ commercial, military, and clinical applications. These products include 3 major components: Acoustic Flashlight, Acoustic Lens Set, and a proprietary Ultrasound (AV) Sensor on a chip. The basis of AV technology is a unique, patented focal plane array which the Company produces in its semiconductor processing facility. Imperium offers engineering services to package a Thru-Transmission solution into a 'proprietary assembly' that accommodates a variety of specialized customer application environments. The Company's Non-Destructive Testing products allow manufacturers to instantly visualize a variety of subsurface faults. Customers can realize a significant improvement in production efficiency, quality and cost reduction, e.g. Acoustocam instantly detect voids, delaminations, cracks, and corrosion in materials in both manufacturing and in-service environments. Illustrated below are two existing applications that Acoustocam supports, e.g. Composite inspection of aircraft and pipe/cylinders.

Inspect Aircraft



Scan Large

Detect Defect



Composite Section (Courtesy: ATK Thiokol)



Product and Prices

ID#	Product	Price
I500PE	I500 Pulse/Echo With 3.5 MHz Transducer; or	\$44,500
I500TT	I500 Thru Trans.	\$44,500
<i>Optional Products:</i>		
1MHz	1MHz Transducer	\$ 2,000
2MHz	2.25MHz Transducer	\$ 2,200
5MHz	5MHz Transducer	\$ 2,500
CAL-AL	Calibration Board Aluminum	\$ 2,000
TC2D	Calibration Board Composite	\$2,000

Price includes product training provided by Imperium at a company designated site for up to 8 people. The price is F.O.B.-U.S.A. Note: Tank and fixture assembly for Thru Transmission configurations are quoted on a case by case basis per specific customer requirements.

Channels and Partners

The company is presently recruiting channel and OEM partners to support its installed base and worldwide growth.

Next Steps

If there are any questions or interest in the products please visit the corporate website at www.imperiuminc.com or contact the company as follows:

sales@imperiuminc.com

Office: 1 (301) 431-2905
Ask for a sales representative

Fax: 1 (301) 431-0200