

Non-Contact Ultrasonic Testing

Introduction

Conventional ultrasonic inspection requires the use of a couplant to enable the transmission of the sound wave into the inspection material. Typically water is the couplant medium, however there are many materials that can be damaged through the use of any liquid couplant. In this case, an air coupled ultrasonic system can be applied provided the material to be tested is compliant to low frequency ultrasonic sound waves, thus "Non-Contact Ultrasonic Testing."

MISTRAS Products & Systems has successfully demonstrated the use of Non-Contact Ultrasonic Testing around the U.S. for a variety of designs and structures. Non-Contact Ultrasonic inspection technology is available for system upgrades in the field and can also be adapted to new systems.

Current Condition

Non-Contact Ultrasonic Testing frequency ranges from as low as 50 kHz to as high as 1MHz. The lower frequencies are used for thicker material and more attenuative materials like honeycomb structures or complex composite materials. The higher frequencies are used for thinner materials that are less attenuative to sound transmission like multi layer composite material.

The inspection technique used is through-transmission where the transmitter transducer is facing the receiver transducer with the inspection material placed between the transducers. The transducers alignment is optimized to achieve the maximum sound energy transmission through the inspected material. The



Composite Sample with Non-Contact, Through-Transmission Ultrasonic Testing

transducers are attached to a through-transmission fixture which is assembled to a mechanical motorized X/Y scanner.

The X/Y scanner moves over the inspection material scanning and indexing in a rectilinear scan creating a 3-D ultrasonic C-Scan Color Image of the integrity of the material. The C-Scan image is the color relationship of the sound wave amplitude variation through the material relating to the variations due to defects, delaminations, impact damage or inclusions.

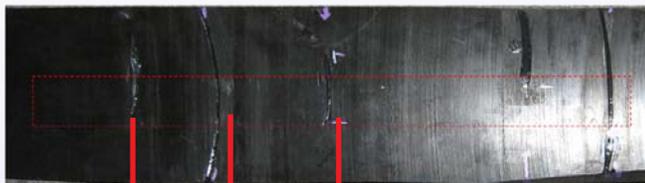
Application Solution:

Application: Varying Thickness Composite Material with Contour Surface

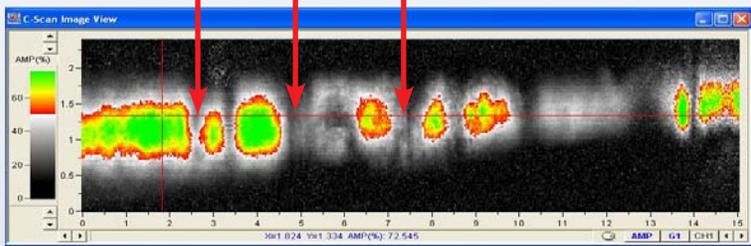
The through-transmission inspection frequency was 500 kHz with gain compensation for maintaining a constant amplitude, 75% of screen height, regardless of the increase of thickness.

Solution: The Non-Contact Ultrasonics was able to penetrate the full thickness of the composite sample with very good signal to noise ratio. Drops in amplitude were observed at the defect locations.

MISTRAS Products & Systems Division is a member of MISTRAS Group Inc. For information on non-contact inspection for a system upgrade or on a new system, please contact our Princeton Junction headquarters.



Defect Locations



C-Scan Image

195 Clarksville Road, Princeton Junction, NJ 08550 USA
Phone: (609) 716-4000 • Fax: (609) 716-0706
Email: sales.systems@mistrasgroup.com • www.mistrasgroup.com