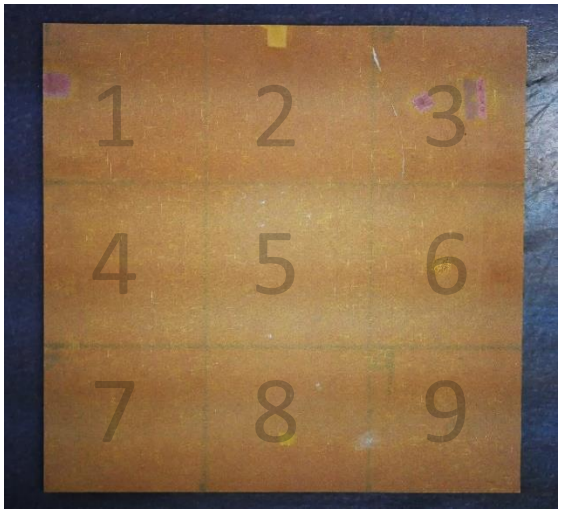
Skin-to-Core Inspection with C-Scan

Application Notes



Background: Inspection of production and in-service composite parts is a time-consuming process that requires specialized knowledge. The ability to simplify the process and present the inspection data in an easily comprehensible way is invaluable for those with rigorous deadlines and exacting standards. Using C-Scans to record and inspect data is an attainable and proven way to increase part reliability and throughput, especially on materials with advanced manufacturing processes like composite skin-to-core samples.

One of our customers needed help setting up a system to inspect in-production core samples with composite skins and Nomex cores. We suggested a solution including the NDT SYSTEMS Bondascope 3100 Bond Tester, the Cross Scan II Automated X-Y Scanner, and PCMS31 pitch-catch probe.

Equipment:

Bondascope 3100

- Handheld Bond Tester
- Pitch-Catch, Mechanical Impedance Analysis (MIA), and Resonance
- Programmable User Setups
- Automatic Probe Recognition
- Alarm Modes, RF and Impedance Plots

Cross Scan II

- Automatic X-Y Scanner
- 24in. x 24in. scan area
- Vacuum Mount System
- Battery or AC Power Sources

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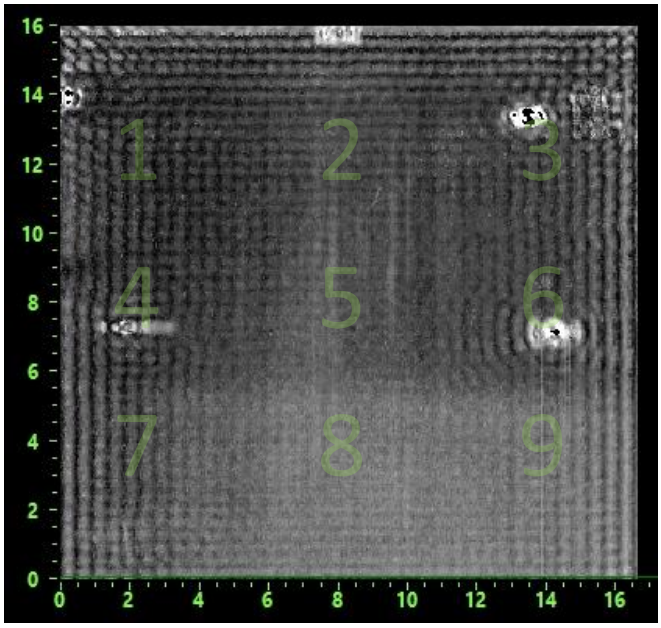
Technical Outline/Procedure: The Bondascope 3100 uses the PC probe to send sound waves through the skin into the cell walls of the core structure, and receives a reflected signal back through the cell walls and skin. Any irregularities in the skin, core, or skin-core interface are detected with amplitude and phase changes in the received signal. The Cross Scan II handles positional encoding and automated scanning, which allows complete and consistent coverage of a test sample. The Bondascope and Cross Scan are matched with an imaging software package to create detailed C-Scan images for high precision evaluation of test parts.

To verify the performance of the NDT Systems Bondascope 3100 in their application, our customer sent in a reference standard with induced defects. This standard is divided into nine sections, each with a distinct composition. To achieve a good Null value, section 5 in the center of the standard is free of defects and is indicative of a successfully manufactured part.

Bond Testing Confirmation by Section
1 – Core to Skin Disbond
2 – Interply Delamination
3a – Poly Release
3b – FOD
4 – Node Bond Split
5 – No Defect Detected
6 – Core Depression
7 – Core Scratch/Groove
8 – No Defect Detected
9 – No Defect Detected



The Bondascope 3100 solution successfully characterized seven out of nine sections, as shown in the table to the left. The flaws in Sections 8 and 9 were not detected with the medium frequency PC Probe. There is an area of no adhesive in Section 8, and an area of folded adhesive in section 9. A higher frequency probe would reveal the defects in Sections 8 and 9, although possibly at the expense of detection of defects at the far side of the sample. In total, the Bondascope 3100 in conjunction with the Cross Scan make up a solid solution for characterizing and evaluating parts with advanced manufacturing techniques. Fine tuning of the system for specific types of flaws yields even more powerful results.

Please contact NDT SYSTEMS for information on similar applications and solutions

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