NASA TECH BRIEF

Nondestructive Sonic Testing of Adhesive-Bonded Composites

A novel and versatile sonic system has been developed for nondestructive testing of adhesive-bonded honeycomb panels or sheet laminates; it is applicable to honeycomb panels of metal or plastics or of both, and to metal-to-metal laminates. The system detects and determines the location, depth, and areas of crushed core or of breaks in bonding between core and adhesive, adhesive and face sheet, or face sheet and external doubler.

The scanner bridge, which guides the transducer over the surface tested, is controlled from a console on wheels that contains the recorder. The system operates as a single-channel sonic resonator or eddy-sonic system, with either manual or automatic scanning; alternatively it may operate in a dual mode with either the eddy-sonic or the sonic-resonator method.

In dual sonic-resonator operation, transducer input and output are switched automatically between the two resonators. Each system can be set independently at a different test frequency so that the characteristic behavior of the panel can be evaluated at two frequencies simultaneously. Dual operation of the eddy-sonic system provides for the detector circuits in each system to be switched into the single transducer in time sequence. Thus the difference in response of the test configuration to two harmonic conditions can be recorded. With this feature is coupled the gating control which provides three-level recording ability: three shades of gray from the facsimile recorder or three colors from the color-dot head. These different modes of operation yield a variety of information regarding the structure tested.

With the sonic resonator a liquid couplant such as glycerin or water must be used with the crystal probe; the eddy-sonic transducer need not touch the surface and requires no couplant. Standard samples of the structure are required for comparison; each should contain no more than one or two defects, and one of them should be perfect.

Notes:

1. Tech Brief 69-10366, Instrumentation for Nondestructive Testing of Composite Honeycomb Materials, contains related information.
2. Requests for further information may be directed to:

   Technology Utilization Officer
   Code A&TS-TU
   Marshall Space Flight Center
   Huntsville, Alabama 35812
   Reference: TSP70-10397

Patent status:

Inquiries about obtaining rights for the commercial use of this invention may be made to NASA, Code GP, Washington, D.C. 20546.

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