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Guided wave sensor technology for monitoring aircraft structure for fatigue failure

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The longerons in aircraft structure are used to transfer loads throughout the fuselage during flight. The aircraft loads are generated by the forces of take-off, landing, buffeting caused by air turbulence during the flights, and the accelerations experienced during the flight spectrum. These loads on the longeron can be very large and it is critical to insure that the longeron can handle these loads without failure. In recent years, a number of failures of longerons and fuselage have occurred in both military and civilian aircraft. Often the designers of the aircraft can predict where potential critical fatigue areas will be and develop an inspection protocol for these areas. However, there are areas where issues have occurred outside the predicted regions. The purpose of this paper is to describe nondestructive evaluation technology, magnetostrictively generated guided wave technology that has been incorporated into a monitoring technology that can provide early warning of potential fatigue damage. The magnetostrictive sensors (MsS) are low profile, light weight, inexpensive and once installed, does not require egress into the area being inspected/monitored. The magnetostrictive process, sensor concept, instrumentation, and data acquisition process will be described. Examples of tests conducted and result obtained will also be discussed.

Biography

Glenn Light, PhD, is the Director of Sensor Systems and NDE Technology Department in the Mechanical Engineering Division at Southwest Research Institute located in San Antonio, TX. He received his PhD in Physics from the University of North Texas in 1978. For 36 years at Southwest Research Institute (SwRI), he has developed sensors, systems, and new techniques for nondestructive evaluation (NDE) of materials and structures. He has applied these efforts to metals, composites, and ceramics. His expertise includes ultrasonic inspection (UT) technology and transducer design, eddy current (ET) probe design, digital radiography, computed tomography, infrared thermography and shearography.

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