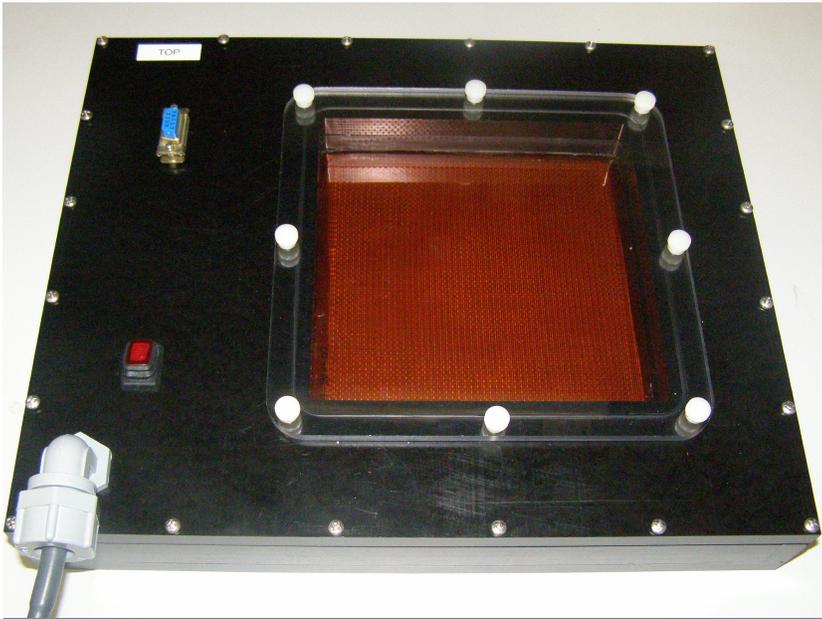




TECHNOLOGY SOLUTION

Sensors



Multidimensional Damage Detection System

Multidimensional system for detecting damage to surfaces and vessels

NASA Kennedy Space Center seeks partners interested in the commercial application of the Multidimensional Damage Detection System technology. The ability to detect damage to composite surfaces can be crucial, especially when those surfaces are enclosing a sealed environment that sustains human life and/or critical equipment or materials. Minor damage caused by foreign objects can, over time, eventually compromise the structural shell resulting in loss of life and/or destruction of equipment or material. The capability to detect and precisely locate damage to protective surfaces enables technicians to prognosticate the expected lifetime of the composite system as well as to initiate repairs when needed to prevent catastrophic failure or to extend the service life of the structure.

BENEFITS

- Diagnostic information collected by the system allows technicians to precisely locate damage and initiate repair activity when needed to prevent catastrophic failure or to extend structural service life
- Modular allows damaged surfaces to be easily replaced without compromising system functionality
- Flexible individual detection layers in the composite structure can be turned on or off to collect damage information as needed for a particular application. Algorithms can be modified to optimize system performance
- Manufacturable conductive pattern for thin film layers can be applied on a variety of substrate materials using multiple application methods. Size, shape, and thickness can be customized to meet users requirements. Connection to the detection system is simple and easy to accomplish.
- Prognostic systems ability to detect and locate damage enables technicians to predict the remaining expected lifetime of the composite system



THE TECHNOLOGY

The Damage Detection System consists of layered composite material made up of two-dimensional thin film damage detection layers separated by thicker, nondetection layers, coupled with a detection system. The damage detection layers within the composite material are thin films with a conductive grid or striped pattern. The conductive pattern can be applied on a variety of substrates using several different application methods. The number of detection layers in the composite material can be tailored depending on the level of damage detection detail needed for a particular application. When damage occurs to any detection layer, a change in the electrical properties of that layer is detected and reported. Multiple damages can be detected simultaneously, providing real-time detail on the depth and location of the damage.

The truly unique feature of the System is its flexibility. It can be designed to gather as much (or as little) information as needed for a particular application using wireless communication. Individual detection layers can be turned on or off as necessary, and algorithms can be modified to optimize performance. The damage detection system can be used to generate both diagnostic and prognostic information related to the health of layered composite structures, which will be essential if such systems are utilized to protect human life and/or critical equipment and material.



APPLICATIONS

The technology has several potential applications:

- Aircraft
- Military Shelters
- Solar Arrays
- Critical Hardware Enclosures
- Spacecraft
- Space Habitats
- Inflatable Structures
- Smart Garments

PUBLICATIONS

Patent No: 9,233,765; 10,138,005; 9,365,302