Innovation and Commercialization

UNIVERSITY OF TEXAS ARLINGTON

Structural Health Monitoring of Composite using Wireless Magnetostrictive Sensor

Tech ID: UTA 19-30

INVENTOR: Kenneth Reifsnider

TECHNOLOGY NEED

Composite materials are extending the horizons of designers in all branches of engineering. These materials have numerous advantages and improved structural properties such as high strength to weight ratio, high stiffness to weight ratio, lightweight, structural strength, and excellent durability. However, these materials experience various types of deformations and damage modes during their service life that are at times challenging to detect. This fact has led to the development of various non-destructive methods for structural health monitoring (SHM) of the damages in these complex material systems. Most of current wireless sensing techniques use relatively large sensors, which are difficult to embed into composites. Therefore there is an increased need to develop wireless *in situ* technique using thinner and surface modified sensors.

INVENTION DESCRIPTION/SOLUTION

We have developed a wireless sensor made from magnetostrictive materials that allows continuous monitoring of the local condition within the composites. This sensor can be either attached on the surface of the composites or embedded within the composites. The sensor response during the tensile loading on the composites is monitored through data acquisition and testing setup. The wireless monitoring using the magnetostrictive sensor can be a convenient *insitu* method for SHM of composite structures.

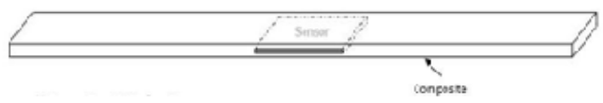

Figure 1:Schematics of composite with embedded sensor

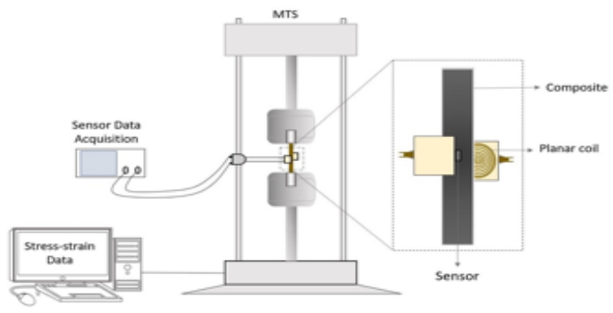

Figure 2: Data acquisition and testing step for embedded sensors

APPLICATIONS

- Structural health monitoring of composite aircraft structures
- Large scale concrete crack detection (CCD)
- Automobiles and military defense
- Structural monitoring of civil infrastructure

KEY BENEFITS

- Non-destructive method for Structural Health Monitoring (SHM) technique
- *In-situ* & real-time monitoring of local strains inside the composites
- Maintain lightweight & high strength of FRP composites
- Improved sensor adhesion properties

STAGE OF DEVELOPMENT

Prototyped

INTELLECTUAL PROPERTY STATUS

Provisional Patent Application

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