PURDUE INNOVATES | Office of Technology Commercialization

Vessels, Such as Tires and Pipes with Integral Life-Sensing Capability

A new low-cost sensing method is available that provides real-time detection and pinpoint location of internal and external structural damage in devices, enabling advanced condition-based maintenance and prolonging operational life.

Many devices are consistently subjected to harsh, unpredictable conditions and become susceptible to external injury. Even with proper maintenance and inspection, some types of damage are not easily detected or preventable. Damage to laminated structures can be especially harmful. Damage to tires occurs because of gap damage within the tread, over-deflection, cults, punctures, imbalance, impact, rubber hardening/degradation, or improper mounting/repair.

Purdue University researchers have developed a sensing method that can alert operators when a device's structural integrity has degraded. This can save time and effort in repairing or deciding to change the tire, and in some situations, prolong the operable life of a tire. This new sensing method not only detects unsafe operating conditions, but also alerts operators of damage that occurs in situ.

Advantages:

-Sensors detect internal and external changes in structural condition

-Ability to sense multiple types of structural damage and pinpoint location of failure

-Low cost solution

-Readily incorporated into traditional manufacturing processes

-Real time life evaluation

-Advanced detection allows safer operation and use of devices, eases repair efforts, and prolongs device life by allowing condition based maintenance

Technology ID

64631

Category

Buildings, Infrastructure, & Construction/Structural Health Monitoring

Robotics & Automation/Perception & Sensing

Authors

Keith Harmeyer

Michael Holland

Gary Krutz

Further information

Parag Vasekar

psvasekar@prf.org

View online

Potential Applications:

-Products with structures subject to stresses that can lead to structural failure, including

tires, airfoils, and pipes used in mobile machinery, automotive, aerospace, manufacturing, and process equipment

TRL: 5

Intellectual Property:

Provisional-Patent, 2005-06-22, United States | EP-Patent, 2006-06-22, United Kingdom | CIP-Patent, 2006-06-22, United States | EP-Patent, 2006-06-22, Germany | NATL-Patent, 2006-06-22, Republic of Korea | NATL-Patent, 2006-06-22, China | NATL-Patent, 2006-06-22, European Patent | PCT-Patent, 2006-06-22, WO | NATL-Patent, 2006-06-22, Japan

Keywords: structural integrity sensing, device damage detection, real time structural evaluation, condition based maintenance, tire damage alerts, structural failure sensing, low cost sensors, in situ damage detection, mobile machinery safety, aerospace equipment sensing, Mechanical Engineering, Sensors