

Composition Structure with Tessllated Layers

Tech ID: 25036 / UC Case 2011-808-0

BRIEF DESCRIPTION

The technology is a tessellated composite structure that is resistant to tearing and fatigue. It features improved resistance to tearing and fatigue damage and is biased towards compression stress, as opposed to tensile stress.

FULL DESCRIPTION

This invention is a tessellated composite structure that resists tearing and fatigue damage by functional compression stress bias. It consists of a composite structure with two layers of relatively stiff tiles (tesserae) that are linked together by a material with a lower stiffness on either side of a core layer that also has a lower stiffness.

Under bend loading conditions, this structure has been observed both with numerical modeling and experimentation to exhibit neutral axis migration, so that tensile stresses in the structure are significantly lower than the compressive stresses. Structures and materials generally exhibit symmetric tension and compression where the neutral axis remains in the same position. The bias towards compression exhibited by the present invention makes it more resistant to tearing and fatigue damage, which are generally more likely under higher tensile stresses.

Tearing and fatigue are common modes of structural failure that are difficult to avoid, particularly under repeated bending. Sandwich composites with stiff outer layers and a more compliant core layer are sometimes used to help avoid these problems. However, outer layers that are tearing and fatigue resistant are typically expensive to implement. Recently, UCI researchers have discovered that a tessellated composite structure can provide the same advantages at a much lower cost. They have developed a tessellated composite structure that is designed to be tearing and fatigue resistant by functional compression bias.

SUGGESTED USES

- » Fatigue and tear resistant construction materials

ADVANTAGES

- » Tessellated layers can be less expensive than conventional layers that are not tessellated that have comparable tearing and fatigue resistance.
- » Tessellated layers made of materials, having comparable costs to layers that are not tessellated, can have greater tearing and fatigue resistance than those materials that are not tessellated.

LEAD INVENTOR

James C. Earthman
Professor, Chemical Engineering and Materials Science

CONTACT

Richard Y. Tun
tunr@uci.edu
tel: 949-824-3586.



INVENTORS

- » Earthman, James C.

OTHER INFORMATION

CATEGORIZED AS

- » **Environment**
 - » Other
- » **Engineering**
 - » Engineering
- » **Materials & Chemicals**
 - » Agricultural
 - » Biological
 - » Composites
 - » Electronics Packaging
 - » Storage
- » **Nanotechnology**

Professor, Biomedical Engineering
Henry Samueli School of Engineering
University of California, Irvine

<http://www.eng.uci.edu/users/james-earthman>

[» Materials](#)

RELATED CASES

2011-808-0

RELATED MATERIALS

- [» Stress relaxation behavior of tessellated cartilage from the jaws of blue sharks - 08/26/2013](#)
- [» Composite model of the shark's skeleton in bending: A novel architecture for biomimetic design of functional compression bias - 10/12/2010](#)

ADDITIONAL TECHNOLOGIES BY THESE INVENTORS

- [▶ Diamonoid Stabilized Fine-Grained Metals](#)
- [▶ Carbon Sequestration Using a Magnetic Treatment System](#)

UCI Beall
Applied Innovation

5270 California Avenue / Irvine, CA
92697-7700 / Tel: 949.824.2683



© 2015, The Regents of the University of
California
[Terms of use](#)
[Privacy Notice](#)