



Innovative Inserts for Sandwich Composite Panels

OTT 1851

Applications

These patent-pending sandwich composite panel inserts maintain a high strength-to-weight ratio, making them ideal for applications where weight reduction is crucial. This includes aerospace, automotive, marine, construction, energy, biomedical, and recreational sports equipment.

Target Problems

Standard inserts for connecting sandwich composite panels are prone to premature joint failure due to stress concentrations from abrupt changes in stiffness, and they typically require post-cure machining. Additionally, they often lack sufficient contact with panels, which limits overall strength and performance.

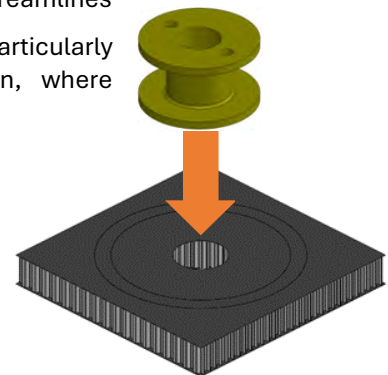
Key Benefits

- **Increased Maximum Force:** >200% in single-lap shear tests and >50% in pull-through tests compared with standard inserts.
- **Superior Energy Absorption:** Improvement of >550% in single-lap shear tests and >60% in pull-through tests compared with standard inserts.
- **Enhanced Stiffness:** >7% increase in stiffness in panels connected with these inserts, contributing to better load distribution and reduced risk of joint failure.
- **Improved Structural Integrity:** The design allows enhanced adhesion between composite sheets and the insert, offering greater structural integrity.
- **Reduced Post-Processing:** Minimizes the need for additional machining, such as drilling holes after the panel cure process.
- **Customization and Flexibility:** Can be tailored to specific requirements and complex geometries

Technology

This innovative insert developed at UW-Milwaukee ensures an even distribution of potting material and minimizes voids, it not only improves adhesion and overall strength but also streamlines the manufacturing process, reducing the need for post-processing. This is particularly beneficial for industries like aerospace, automotive, and construction, where performance and reliability are crucial.

The use of additively manufactured sandwich composite panel inserts represents a significant advancement over traditional materials like metallic inserts, honeycomb core structures, viscoelastic layer inserts, and fully integrated polymer sandwich panels. This technology offers superior performance and reliability, making it a valuable development in the field of composite materials.



Intellectual Property

Provisional Patent application filed Spring 2024.

About the Inventor(s)

[Rani El-Hajjar](#), UWM Associate Professor, Civil and Environmental Engineering and [Patrick Severson](#).

Please contact UWM Research Foundation for further discussion: licensing@uwmrf.org.