National Aeronautics and
Space Administration

Fiber-Reinforced Foam (FRF) Core Sandwich Composite Structures

Strong and lightweight materials with improved strength, stiffness, and damage resistance

TECHNOLOGY OPPORTUNITY

NASA's Glenn Research Center invites companies to establish partnerships to explore applications for its novel FRF Composite Structures. FRF sandwich composites offer significant weight savings over traditional metal components, and they can easily be manufactured to meet specific functional requirements. The composites can withstand severe impact caused by fragments or debris and are ideally suited for use in dynamic loads.

BENEFITS

- **Versatile:** Technology allows for multifunctional design possibilities (structural strength and noise attenuation)
- **Lightweight:** 30 to 40 percent lighter than traditional metal parts
- **Rugged:** Environmentally durable material
- **Efficient:** Same energy absorption as metallic structures but at half the weight

TECHNOLOGY DETAILS

These manufacturing processes and design tools were originally developed by NASA for use in safety-critical aerospace components with severe impact and dynamic load requirements (i.e., jet engine fan casing/fan blade failure containment system). Glenn Research Center has developed structural analysis and sizing optimization tools for the fabrication of components that are strong, lightweight, durable, and impact resistant.

HOW IT WORKS

These engineered core composite sandwich structures are made from foam and structural fibers (e.g., glass or carbon) using fiber placement and resin infusion molding processes. The process has been adapted to allow the FRF cores to be produced in (1) a continuous sheet roll (sheet core process) for panels or (2) a continuous snake (snake core process) for cylindrical components such as fan containment casings. These “spoolable” core forms enable more streamlined and automated manufacturing of unitized or monocoque structures.

WHY IT IS BETTER

FRF sandwich composites are an improvement over standard composite fluted structures due to their ability to be customized for various engineering applications. The materials used, as well as the structural design of the FRF sandwich composite, can be tailored to suit unique applications. Simple changes to the foam material will alter the characteristics of the final product to improve impact resistance, acoustic absorption, vibration damping, and thermal insulation. Changes to the structural design can result in structural improvements (e.g., lighter weight) without sacrificing structural integrity.

LICENSING AND PARTNERING OPPORTUNITIES

Glenn’s Office of Technology Partnerships and Planning seeks to transfer technology to and from NASA to benefit the space program and U.S. industry. NASA invites companies to consider partnering in the application of Fiber-Reinforced Foam Sandwich Composite technology (LEW–18527–1 and LEW–18528–1).

FOR MORE INFORMATION

For more information about this and other technology licensing opportunities, please contact

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