



NASA Langley's Multi-Functional Composite and Honeycomb Panels

Acoustic radiation efficiency reduced while
maintaining strength to weight ratio

Composite and honeycomb structures are commonly used for their high strength and low weight. However, they are characteristically poor at isolating internal structural vibrations, which are transmitted as radiated noise. Traditionally, designers have reduced radiated noise by adding weighty sound insulation schemes, thereby compromising the purpose of the structurally efficient panel. NASA Langley solved the problem by creating recessed areas in the core that lower the acoustic radiation efficiency. Since the recesses would have reduced the strength of the composite construction as well, Langley researchers created a variety of embedded reinforcing sub-face sheets and domed variations of those sheets to carry the required loads.

Benefits

- The construction method is lower weight, higher strength, and lower in radiation efficiency than alternative comparable designs
- The design adapts well to various geometries and applications as well as manufacturing methods

partnership opportunity





The Technology

The sandwich composite construction comprises interior and exterior panels that capture an internal honeycomb core. The honeycomb core, instead of being full thickness across its entire area, incorporates a pattern of recesses to create areas of reduced stiffness. The reduced stiffness forces the normally supersonic waves in the structure to drop to subsonic speeds, thereby lowering the acoustic radiation efficiency of the composite structure in those areas. To make up for the loss in stiffness created by the recesses, various reinforcement schemes are employed in the recesses. A side effect of the reinforcements is that they create embedded double-wall cavities that contribute to the sound attenuation character of the design.

Patent applications have been filed, but patents have not yet issued.

Applications

Aside from aviation and aerospace uses, this technology is beneficial for

- Enclosures – cleanrooms, machine enclosures, plant offices, modular shelters, broadcast studios
- Architectural – churches, offices, studios, cinemas, theaters, elevators
- Transportation – marine vessels, passenger rail cars, custom truck bodies and trailers
- Stage and flooring – stage decks, portable dance floors, raised exhibit platforms
- Sales displays – store fixtures, trade show and museum displays, art preservation
- Industrial – work surfaces, platens, elevator cabs, equipment components
- Office – marker boards, furniture, partitions

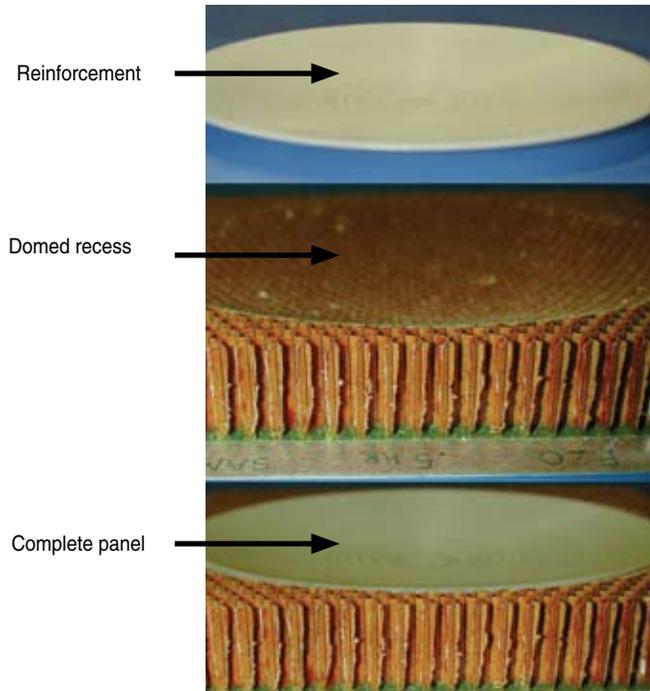


Figure 1: Maintaining the voided space is important as it provides a measure of noise reduction and space to which additional treatment can be applied. The load-carrying capability of the panel can be further increased by using a domed recess and formed sub-face sheet.

For More Information

If your company is interested in licensing or joint development opportunities associated with this technology, or if you would like additional information on partnering with NASA, please contact:

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