A Soundproof Idea to Block Noise

Boeing Scientists Developing a 'Wallpaper' With Potential for Use Across the Aerospace Industry

Imagine a high-tech "wallpaper" that uses compressed air to block outside noise on an airplane, protect sound-emitting military equipment from detection in the field, or shield sensitive satellites from deafening rocket sounds. Such a solution is not so off-the-wall.

New technology is being developed called "fluidic wallpaper" that has many potential applications for protection, privacy and stealth. This Boeing Business Jet, for instance, could take advantage of the new lightweight sound-stealthy wallpaper to provide an even quieter atmosphere for in-flight meetings and improve en route productivity in the on-board conference rooms, executive offices and individual work spaces.

Scientists at Boeing are working on a technology that could actively suppress unwanted sound inside airplanes and even make life more comfortable for astronauts in space. The technology, called "fluidic wallpaper," has many potential applications for protection, privacy and stealth, and is being developed by Phantom Works, the research and development unit of The Boeing Company where advanced technologies, processes and systems are developed.

Anders Andersson, a Phantom Works Technical Fellow in Seattle, said the system promises to be "a breakthrough in acoustics technology."

The wallpaper is an active-control system using "smart" materials and will be about a quarter-inch thick. It will employ compressed air to counterbalance oscillating pressures that make up low-frequency noise. Low-frequency sound is emitted by such commonplace systems as propellers, jet engines, and heavy-duty diesel engines, and is easily transmitted through walls and windows.

Reducing sound has traditionally commanded heavyweight solutions -- layers of sound-suppression materials that give the vehicles unwanted pounds and cost. Fluidic wallpaper would weigh much less than traditional materials, take up less space and be produced inexpensively. The compressed air used within the wallpaper could be generated by aircraft engines or air conditioning and would not require electrical power. The wallpaper is projected to be unmatched by any other concept in its low-frequency noise performance, according to Andersson.

"We're still in the early development stages and there's a lot of testing to be done," Andersson said.

Unwanted sound currently is controlled by various methods. The first strategy Boeing uses is to design systems that are quiet in the first place. When necessary, however, noise treatment measures must be developed. A few current treatments include:

- Acoustic panels in the engine enclosure
- Insulation and vibration-damping materials in the fuselage walls
- Vibration isolation mounts for mechanical equipment
- Mufflers in the air conditioning and Auxiliary Power Unit systems

"Although we already take a lot of steps to make modern airplane cabins quiet, there's always room for improvement," said Larry Craig, chief engineer in Noise and Emissions Engineering at Boeing Commercial Airplanes. "And, an added advantage of this new 'fluidic wallpaper' is that it promises to be inexpensive and very lightweight compared to many other sound treatment measures."

Andersson foresees plenty of applications for fluidic wallpaper.

It could be used, for example, as wall trim in commercial airplanes, and in executive airplanes and military transports to satisfy command-post communication and stealth requirements. It could muffle the noise of armored vehicles and improve communication and the quality of life for astronauts aboard the International Space Station. The system could be built into equipment tarps that would shield the outside world from noisy generators and other equipment and prevent their detection in military operations. Rocket fairings could be lined with it to protect sensitive satellite payloads from the effects of noise generated by a launch.

"There is potential for building a whole industry around this concept," Andersson noted.

Spanish Version (PDF)

###

Image is available for editorial use by news media on boeingmedia.com

For further information:
William Cole