soundbarrier

Engineered silicone polymers are being used to reduce noise in aircraft interiors

Improving the passenger experience is a strategic initiative for most aircraft manufacturers and airlines. Part of that effort involves reducing the noise level within a commercial aircraft. "Acoustic design and noise mitigation is now imperative to providing a successful passenger experience," says Mike Brock, product manager for Rogers Corporation's Bisco range of silicones. "Good acoustic design reduces noise levels with unique design techniques that often require targeted materials. In addition to reducing noise, the materials must offer the flammability, smoke, toxicity, weight and durability performance demanded by the aircraft industry."

There are various ways to mitigate noise within the aircraft interior. One method is to isolate vibrating components such as luggage bins or galley compartments. Often, cellular or solid elastomeric materials are used to isolate this vibration from the source. "One key material characteristic often overlooked is an elastomer's ability to resist taking a compressive set," says Brock. "If the material lacks resiliency and 'bottoms out' over time the vibration transmits and the elastomer has failed to complete its function, ultimately creating noise in the cabin. Many elastomeric materials will permanently deform under compression."

Brock says one of the key benefits of a silicone elastomer is its ability to maintain its structure under compression. "Cellular silicone materials exhibit excellent memory, making them a long-term solution to reducing vibration-induced noise in aircraft interiors," he says. "The test method often used to test a material's resiliency is ASTM D1056, and silicone materials typically rebound to 95% of their initial thickness after 22 hours of 50% compression at 100°C. But not all silicone foam materials are created equal. Platinum-cured foams with post-curing offer significantly better resiliency than peroxide-cured materials."

Silicone foams and rubbers can be directly cast onto reinforcing materials such as aluminium foil or fibre glass. "The ability to cast directly onto another material eliminates a potential source of failure – adhesive delamination," says Brock.

Another method to reduce noise is to block sound generated from a source such as the engine or airflow over the fuselage. "With new composite aircraft this is especially important as the acoustic performance of composite material is different from aluminium," says Brock.

Rogers has developed reinforced solid silicone materials engineered to act as sound barriers in aircraft. "Solid silicone materials are often an excellent choice for aircraft applications because of their reliability in flame, smoke and toxicity testing," says Brock. "In addition, silicone-based polymers maintain physical properties over a wide temperature range, and exhibit extremely low water absorption. Silicone properties have been known to show very little ageing, making them a reliable choice for installations that need to be in place over an extended lifetime."

In conclusion, as airlines look to improve the customer experience, material solutions are helping to mitigate vibration. "Engineered silicone foams and rubbers offer a resilient, long-term solution to many vibration or acoustic needs," says Brock. "Applications throughout the cabin include carpet padding, vibration isolators, thermal or acoustic barriers, and many others."

Mike Brock
+1 630 784 6237
mike.brock@rogerscorp.com
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