

Tech focus

Advanced materials developed to address technical design challenges are this month's focus.

Finding a better corrosion-control solution

Continental Airlines has determined through two years of operational experience on new-production **Boeing** Next-Generation 737s that long-term corrosion is significantly reduced in cargo compartments and around lavatories and galleys through the application of a polyurethane material embedded in fiberglass mesh with a polytetrafluoroethylene (PTFE) backing. The product, called Hi-Tak, is manufactured by **Av-DEC** in Fort Worth, TX.

"As soon as an airplane is delivered from Boeing, we take out the existing Skyflex tape," said Chuck Hickey, Senior Engineer, Services Engineering Department, Continental Airlines Technical Operations. "We found that the tapes trap water and do not hold up over time, and actually help corrosion propagate."

Skyflex is manufactured by Newark, DE-based **W. L. Gore & Associates**. Skyflex Aircraft Sealant is a non-curing, nonhazardous form-in-place product manufactured from 100% PTFE.

Boeing has traditionally used the Skyflex product in its airframe manufacturing process, and Hickey says the airframer has been reluctant to do the extensive testing necessary to certify the more-expensive corrosion-control tape from Av-DEC for installation on the assembly line. However, Boeing has approved Hi-Tak as an alternative to Skyflex and other products like Patco brand tapes from **Tyco Adhesives** in retrofit situations.

"We've experienced widespread corrosion in the cargo compartment due primarily to Boeing not using the latest and greatest (corrosion-control products)," said Hickey. "They use foam tapes or Teflon tapes that don't bond well to the structure."

Hickey said that Continental's structures group became aware of the Av-DEC product two years ago when its avionics department began to use the



Unlike phenolic and plastic plugs, Av-DEC's self-leveling polyurethane compound completely fills spaces in seat tracks to block out moisture. Shown is the company's Thixoflex Orange used as a dam for the SelfLeveling Green product.

company's pre-cured polyurethane antenna gaskets to "change an antenna while the plane is in service" without having to wait 8-10 hours for polysulfide sealants to cure. The airline's avionics technicians found the Hi-Tak material easier to work with than polysulfide products from companies like **PRC DeSoto**, now part of **PPG Industries**, that harden and prove difficult to remove for maintenance.

Continental engineers realized that Hi-Tak in the form of a self-leveling compound might similarly prevent moisture intrusion in cargo compartments and through injection into the seat tracks that run beneath monuments such as lavatories and galleys in the aircraft cabin. Boeing's pre-cut phenolic or plastic pieces were not properly filling the spaces in seat tracks to keep out moisture, according to Hickey.

"Injecting the material fills every crack and creates a moisture seal that cures to a semi-hard state," said Hickey. "When you have to remove it to inspect beneath the monuments, it comes out in one piece, and dirt and debris sticks to it."



Low viscosity of the two-component urethane material allows for application where self-leveling is desired, and acts as a watertight flexible sealant in backshells.

The injectable Hi-Tak material used for seat tracks feels wet and tacky to the touch, and flows between the fingers when squeezed together. Designed for repeated use to seal and moisture-proof irregular surfaces where abrasion resistance is required, the product also demonstrates adhesion to itself (cohesion). It is resistant to water, polypropylene glycol/water, Skydrol lubricant, Mil-H-5606 hydraulic fluid, and Jet A fuel.

"You have aluminum seat tracks and then seat tie-downs of a different material. Once moisture gets in there, the electrical currents flowing through the airplane creates a battery, which causes corrosion," said Will Bogert, Av-DEC Commercial Programs Sales and Marketing Manager.

In addition to Continental, Hi-Tak products—primarily the company's antenna gaskets—are also used by a variety of commercial carriers and military organizations, including **Delta**, **American**, **Northwest**, **FedEx**, and **UPS**, as well as various military services for helicopters, transports, and fighter aircraft.

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