

LIGHTWEIGHT INTERIOR PANELS WITH ULTEM™ RESIN

SABIC helps aircraft suppliers meet standards for lightweight interior panels while reaching new heights of manufacturing efficiency.

With ever escalating fuel costs, aircraft manufacturers are on the lookout for new ways to coax greater fuel efficiency from their planes. The use of aramid fiber honeycomb-core materials in laminated panels helps to significantly reduce the weight of aircrafts. However, these materials must meet increasingly stringent standards for flame, smoke and toxicity (FST). When Tubus Bauer, a leader in thermoplastic honeycomb-core technology, sought to meet aircraft specifications for FST standards, the company realized it needed to move beyond traditional polycarbonate (PC) and polypropylene (PP). When Tubus Bauer talked with Ten Cate Advanced Composites B.V., they found a partner who wanted a thermoplastic that could replace aluminum and thermoset resins in the core, enabling the entire panel to be thermoformed. To find a solution to this two-part challenge, the suppliers worked with SABIC.

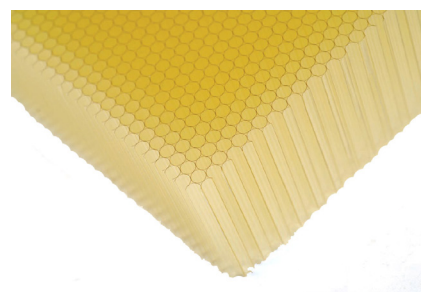
IMPROVING PERFORMANCE, SAFETY AND COST-EFFECTIVENESS OF AIRCRAFT INTERIOR PANELS

To carry greater loads while conserving expensive fuel, aircraft OEMs are eager to find new ways to reduce weight. For interior panels such as flooring, sidewalls, partition walls and luggage bins, a promising approach is the use of thermoplastic honeycomb-core technology. Offering strength and stiffness combined with light weight, honeycomb cores have traditionally been made from standard aramid fiber-based honeycomb, as well as aluminum.

Tubus Bauer GmbH, a German manufacturer of honeycomb-core materials, wanted to expand its business into the aerospace industry but faced several performance issues. Working with major aircraft OEMs, Tubus Bauer identified key requirements for materials to be used in aircraft interior panels - compliance with industry standards for flame, smoke and toxicity; ability to meet aircraft specifications for materials and parts; outstanding mechanical performance; and low weight.

Because the honeycomb core must be laminated on both sides to create a structure suitable for interior panels, Tubus Bauer partnered with Ten Cate Advanced Composites, a global supplier of advanced composite laminate materials for the aerospace industry. However, the laminate presented further opportunities. To avoid time-consuming process steps – and higher system costs – involved with the use of thermoset resins, the partners wanted a replacement material that would eliminate secondary operations. They also wanted the design flexibility provided by thermoforming, which could not be done with thermoset composites or aluminum.

“With this long list of requirements, we knew we needed a materials supplier with a broad portfolio of next-generation thermoplastics and exceptional technical expertise,” said Frank Fischer, Managing Director of Tubus Bauer. “We chose SABIC to provide a solution to this two-part application challenge and they delivered exactly what we were looking for.”



ULTEM RESIN FOR INHERENT FLAME RETARDANCE AND HIGH STIFFNESS

SABIC helped Tubus Bauer and Ten Cate find a great solution to their myriad challenges – ULTEM resins. These amorphous thermoplastic polyetherimide (PEI) resins offer inherent flame retardance, high strength and stiffness and broad chemical resistance. ULTEM resin grades meet such aerospace industry requirements as the FAR25.853 and OSU standard, for low FST and heat release.

To produce the honeycomb core, ULTEM resin is extruded into hollow tubes that are cut to length and joined using a thermo-bonding process for adhesion. For the laminate, low-viscosity ULTEM resin is incorporated into a glass fiber or carbon fiber matrix composite. After the sandwich structure is assembled, it can be thermoformed into two- and three-dimensional shapes, and directly painted.

LIGHTWEIGHT INTERIOR PANELS WITH ULTEM RESIN

“ULTEM resin is a remarkably versatile material that targets today’s issues, including light weight for fuel economy, and elimination of hazardous additives for environmental protection,” said Kim Choate, Innovative Plastics’ Mass Transportation Marketing Director.

“With many grades to choose from, ULTEM resin can solve a variety of performance and design challenges for the most demanding industries, including aerospace”, said Hilmar Backer, Global Industry Leader, Aircraft Interiors for SABIC’s Innovative Plastics business.

END RESULT: IMPROVED PERFORMANCE AND DESIGN FREEDOM AT LOWER SYSTEM COSTS

By replacing standard PC or PP with ULTEM resin, Tubus Bauer and Ten Cate were able to produce a new honeycomb-core product that meets aircraft and transportation industry specifications for passenger safety. ULTEM resins are inherently flame retardant, avoiding the use of halogenated additives that are regulated by the European Union and other countries as hazardous materials.

ULTEM resin also provides exceptional stiffness (flexural modulus of 3300 Mpa) at very low weight, contributing to improved fuel economy.

Ten Cate’s use of ULTEM resin in the composite delivered several important advantages.

First, using a thermoplastic resin instead of a thermoset significantly reduced processing time. Instead of spending up to an hour on lay-up, assembly, curing, sanding and priming, Ten Cate can thermoform the pre-assembled sandwich sheets in a few minutes. Further, there are no refrigerating units needed to keep stored thermosets from curing prematurely. Finally, because ULTEM resin helps deliver an excellent surface finish, the laminate can be painted without any preparation.

By boosting performance while reducing cycle times and infrastructure costs, the partners can achieve a competitive differentiator with their combined product. And with greater design freedom provided by the thermoplastic resin, new applications and markets can become a reality.

“One of the most important benefits of this solution is competitive advantage,” said Nick Tiffin, Business Development Manager for Ten Cate. “We have the ability to thermoform the sandwich panels into forms that were never possible using thermosets or metal.

Plus, we save time in processing and increase capacity for the fast growing market of aerospace. These factors give us the ability to adapt our combined product for additional aerospace applications – such as ducting systems, luggage compartments, and galleys – as well as for success in other industries.”

DETAILS AT

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