AIM Altitude and partners develop nanocomposite material for interiors

AIM Altitude, Composites Evolution Limited and Sheffield Hallam University have collaborated to develop a new nanocomposite material for cabin interiors, as part of research and development project backed by Innovate UK.

The material has exceptional fire and mechanical performance, suitable for use in aircraft interiors. The team has developed a unique thermosetting resin system, which is a blend of poly(furfuryl alcohol) (PFA) with a specific additive mix, for the production of glass fibre pre-pregs using a hot-melt process.

The successful conclusion of the project in August 2020 is expected to bring to market a new family of materials with improved performance, enabling greater design freedom, including new decorative finishes, and a safer passenger environment.

“Materials and design options for composites in fire-critical applications are currently very limited," said Vernon Thomas, Engineering Manager at AIM Composites. "The nanocomposites we have developed have led to enhanced performance all round. It is a better, safer product, which is bio-based and renewable. The fire, smoke and toxicity (FST) performance is better than phenolics. The reduced porosity has great advantages for the finish, reducing costs considerably, and peel strength improvement gives vital increases to integrity and durability. All of which offers airlines greater opportunities for differentiation.”

Bio-based and sustainable

The PFA resin base is produced from biomass waste, which has a mature, secure, low-cost supply, and does not compete with food production so is completely sustainable. The composite is similar to phenolic, but without the toxic phenol and formaldehyde compounds, making it safer across the whole product lifecycle.

Dr Brendon Weager, Technical Director of Composites Evolution, said: “Working with Sheffield Hallam University and AIM Altitude has given us the opportunity to fully explore our new product ideas. The nanocomposite solution we have developed has so many improved features it will redefine composites capabilities.”

Improved properties

The resulting cured pre-pregs have been tested at AIM Altitude’s facilities in Cambridgeshire and have shown substantially better fire properties than current phenolic pre-pregs. The surface finish is also superior, which in itself will substantially reduce downstream costs in defect rectification and preparation for decoration. The enhanced fire properties will permit the use of some decorative finishes not currently available for commercial aircraft interiors.

“This collaborative project has been a great opportunity to investigate and apply some really interesting materials science to a leading application with potentially great impact," said Dr Francis Clegg, Principal Research Fellow at Sheffield Hallam University.