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## TRB Lightweight Structures Develops New FST Rated Biocomposite Rail Carriage Door Leaf

- a sustainable lightweight CFRP solution for rolling stock that is 35% lighter than a bonded aluminium door leaf design

***June 12, 2018, Huntingdon, UK***

TRB Lightweight Structures Ltd., based in Huntingdon, has developed a new biocomposite resin based carbon fibre reinforced (CFRP) sandwich panel door leaf with a 100% recycled foam core. This new biocomposite door leaf product has been specifically designed and fire rated for both overground and underground rail use; the composite structural system easily passes BS 6853 and BS 476, as well as being EN 45545 HL3 compliant. TRB can now offer the rail industry a sustainable, 'green' composite material option for carriage door leaves at a comparable cost to aluminium bonded door leaves, with a 35% weight saving. This has been achieved by TRB applying its in-house understanding of composite materials technology and expertise to railway applications, broadening its product offering to its established rail industry customer base to meet a growing global market need to use greener, more energy efficient products.

The design and engineering team at TRB has worked closely with a resin partner to develop a new, proprietary carbon fibre compatible bio prepreg resin. Key criteria for TRB was that the new system had to be highly sustainable and enable them to cost effectively manufacture lighter weight composite parts that would meet even the most demanding fire, smoke and toxic fumes (FST) specifications in subterranean rail applications. The new 'bio' prepreg, which is non-toxic and does not use volatile organic solvents, is based on a Polyfurfuryl alcohol (PFA) resin derived from a renewable alcohol produced from a natural waste bi-product from refined sugar production.

This new biocomposite prepreg system, which TRB state is the first sustainable fire rated material of its type on the market, has been developed exclusively for TRB to manufacture components for FST rail applications; as well as carriage door leaves, the TRB bio prepreg based system can be used for other rolling stock parts. The foam core used in the rail door leaf composite structure is produced from 100% recycled consumer plastic. It was selected by TRB as the recycled foam core meets its key 'high sustainability' specification objective and delivers the desired overall material properties performance of the sandwich panel construction when used in combination with the woven carbon fibre fabric on both sides and the bio resin prepreg. Other matrix design options for other applications using glass fibres, natural fibres, or aramid fibres can be custom made by TRB on request. Depending on rail customer needs, door leaves are supplied with a gelcoat, finish painted or primed ready to paint.

The fire performance of TRB's new biocomposite based system specified for rail carriage door leaves is outstanding. According to independent data, the sandwich panel system when tested to BS 476 Part 7: 1977

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for 'Spread of Flame' easily achieved a Class 1 Category 1a rating, with a 30% less recorded flame spread of only 50mm in the 1.5 minute test time; the maximum allowable is 165mm for the Class 1a rating.

Lyndon Newman, Chief Engineer for TRB commented: *"We are extremely pleased with the overall performance data for the new biocomposite carbon fibre prepreg sandwich panel system, in particular the FST specifications achieved. In the 30 years I have been in the industry I have never seen such impressive fire performance test results for a non-phenolic based thermoset system, achieving the BS standard so comfortably. Our PFA bio resin prepreg has fire retardant properties greater than phenolics, plus excellent temperature and chemical resistance."*

Lyndon went on to say: *"We initially developed this biocomposite product for rail door leaves, but it could be used for other mass transport interior applications. We have brought aerospace prepreg technology to our rail customers and can now offer them a truly 'green' material design option that is 35% lighter than a bonded Aluminium door at a comparable cost."* The data provided by TRB compares a 'like for like' door leaf in aluminium which weighed 40kg excluding any fittings or door furniture to the same sized door produced by TRB in its new biocomposite CFRP prepreg sandwich panel system, which weighs just 26kg.

The TRB biocomposite CFRP door leaf product, which has a 40 year life cycle expectancy, is more robust than its aluminium equivalent, has superior fatigue resistance and low maintenance costs. Due to the significant weight reduction, the composite door leaf requires a less heavy duty door operating system and provides a number of cost saving benefits to rail operators, such as: reduced energy consumption per journey; less track wear and tear. Additionally, they provide the opportunity for shorter station dwell times as the lighter door leaves open and close several seconds faster; for Transport for London, this has been calculated as a way to improve its daily underground service when installed, by enabling an additional tube train to be run per day on a line where needed to ease peak time congestion.

International Railway Industry Standard (IRIS) approved, TRB has been manufacturing high quality rail doors and rail interior products for over 60 years, which are used in trains and transportation systems worldwide. It has extensive experience in both new train builds and refurbishment of existing trains.

TRB has grown into a leading international manufacturing and engineering company which specialises in the design, testing, validation and production of lightweight composite products. Today, TRB supplies rail, aerospace, defence and several other sectors such as electric vehicles, providing customers with a complete concept to delivery service.