



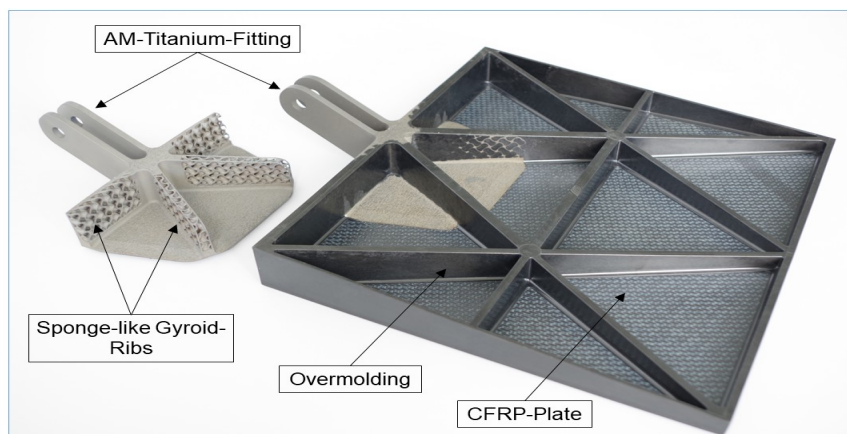
Premium AEROTEC demonstrate potential of a modern hybrid design for future aircraft lightweight structures

Augsburg, 14th November 2019 – With the successful completion of the project TOAST (ThermOplast Additive Manufacturing STrukturen), Premium AEROTEC GmbH present the impressive potential which a modern hybrid design of carbon fibre reinforced plastic and metal offers for future lightweight structures.

Today's aircraft structures consist of many different materials. For example, the fuselage and wing structure of the Airbus A350XWB is constructed mainly of composite and metal parts. Here, parts are joined, per classical hybrid design, with bolts and rivets. This design leads to high costs and time effort. Additionally, the high number of fasteners in this classical hybrid design introduces unnecessary weight, as well as stress concentrations at load introduction points.

In the project TOAST, Premium AEROTEC has presented completely new methods of joining different materials. In this way, the disadvantages of the classical hybrid design with bolts and rivets can be eliminated. In less than five months, a demonstrator of an aircraft airbrake-like structure in modern hybrid design was developed and manufactured. It consists of a titanium load introduction fitting, a CFRP thermoplastic plate and an injection over-moulding.

The novelty at the demonstrator is the connection of the different materials without bolts or fasteners. This was only made possible by the use of additive manufacturing. The titanium fitting was designed with pins on its lower side and ribs designed with gyroid structures. Initially the AM-part was pressed together with the CFRP plate in the thermoforming process. Afterwards the v-shaped ribs were manufactured in an injection moulding machine. Hereby the injection moulding material was pressed into the sponge-like gyroid ribs of the titanium fitting. The joints in the demonstrator were realised either by material connection (CFRP – CFRP) or form closure (titanium AM – CFRP). In parallel, structural tests for the determination of the mechanical properties of the joints were performed. These tests showed that the load transfer capabilities were similar to those with rivets and bolts.





The advantages of the modern hybrid design, in comparison to the classical hybrid design, lie in the fast manufacturing and the assembly without fasteners. Fewer parts are necessary, the process steps for the assembly are shorter and automated. Additionally, the efficiency of the design freedoms of AM and injection moulding lead to weight reductions. This technology can be applied anywhere where loads must be transferred between points and surfaces.

Premium AEROTEC is the first component manufacturer in the world to supply 3D- printed components made out of titanium alloys for serial aircraft production. Premium AEROTEC is a global player in the aviation industry and achieved a turnover of € 2 billion in 2018. Its core business is the design and construction of aircraft structures in metal and carbon fibre composite material. The company has sites in Augsburg, Bremen, Hamburg, Nordenham and Varel in Germany as well as Braşov in Romania. Premium AEROTEC employs around 10,000 people in total.

Further information is available at www.premium-aerotec.com

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