

ON THE APPLICATION OF FIBER METAL LAMINATES IN LARGE AIRCRAFT

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Fibre metal laminates offer significant improvements over current available materials for aircraft structures. While weight reduction and improved damage tolerance characteristics were the prime drivers to develop these new family of materials, it turns out that they have additional benefits which become more and more important for today's designers, e.g. cost reduction and improved safety. The combination of these aspects in one material is an extraordinary achievement. It shows that GLARE is a unique material for aircraft applications. Moreover, it makes clear that, through its unique combination of properties, GLARE is a strong candidate material for fuselage skin structures of the new generation of aircraft.

Fiber Metal Laminates for Large Aircraft Applications Fiber Metal Laminates , also known as FMLs , are composite materials consisting of thin layersn of high-strength aluminum alloy alternately bonded to layers of fiber-reinforced epoxy resin. FMLs significantly reduce weight compared to metal structures already in use. In some cases, to cover the increased cost of materials currently available. These properties provide material damage resistant qualities along with fatigue resistance. There is a new approach to this hybrid material called spliced or bonded laminated fiber metal laminates. This approach also led us to use larger laminates to enrich the larger dimensions in production. FMLs in the aerospace industry.

The introduction of new materials has a significant impact on the design process of new generation aircraft. In most cases, the adoption of constructive applications by aircraft designers requires a period of science that includes many decades. The introduction of a new material requires the coordinated efforts of several disciplines, and it always begins with the investment of a large amount of time and money; in other words, it is an economically risky move. Fuel used and maintenance costs are two of the most important components of Direct Operating Costs. «Continuous



efforts have been made to build airframes in new materials to significantly reduce weight as well as reduce the amount of maintenance required.» Delft University of Technology found that the rate of fatigue crack development in adhesive layered materials can be slowed to a manageable level. Slowing down the rate of crack development is maintained for as long as possible or until a crack appears in the sheet next to it. The main motivation behind the research in Delft was the pursuit of a material with high fatigue resistance.

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