



GLARE[®] Laminate with S-2 Glass[®] Fiber

High-Strength Solutions for Your Toughest Reinforcement Challenges



Airbus A380



S-2 Glass Conventional Roving Package



GLARE Laminate

Aircraft manufacturers worldwide are always exploring and evaluating materials that can save weight. One of the most exciting materials under evaluation for primary and secondary aircraft components is GLARE laminate, a sandwich material constructed from alternating layers of aluminum and S-2 Glass[®] fiber with bond film. The material, developed at Delft University of Technology in the Netherlands, has been recognized as one of the top aerospace materials for the future.

GLARE laminate made with AGY's S-2 Glass reinforcement offers significant weight savings (15-30 percent) when compared to conventional aluminum alloys. Corrosion resistance is enhanced as the laminate's structure acts as a barrier to the penetration of moisture.

Major airframe manufacturers including Airbus and Boeing are evaluating and qualifying GLARE laminate for applications ranging from aircraft skins to floor panels and fire walls. For example, GLARE laminate was chosen for several key components on the Airbus A380 passenger jet. These include upper fuselage skins, fuselage butt straps and leading edges of the horizontal and vertical stabilizers.

Outstanding fatigue resistance and impact properties, impressive mechanical properties, solid fire resistance, and lightning strike resistance are some of GLARE laminates many desirable attributes.

Features	Benefits
Glare laminate is produced using autoclave technology	Allows existing manufacturing technology and investments to be used.
Continuous S-2 Glass fibers bridge the aluminum splices	Allows tailor-made skins of any size, not limited by the width of aluminum rolls.
Crack growth rates 10 to 100 times slower than aluminum	Provides outstanding fatigue resistance
High temperature performance of S-2 Glass is 150°C (302°F) greater than E-Glass.	Provides excellent fire resistance enhancing safety

PRODUCT INFORMATION

Outstanding fatigue resistance and impact properties, impressive mechanical properties, solid fire resistance, and lightning strike resistance are some of GLARE laminates many desirable attributes. Figure 1 illustrates the enhanced fatigue properties offered by GLARE over the traditional 2024-T3 aluminum alloy used in aircraft structure. Table 1 shows a comparison of GLARE to 2024-T3 aluminum in some critical areas.

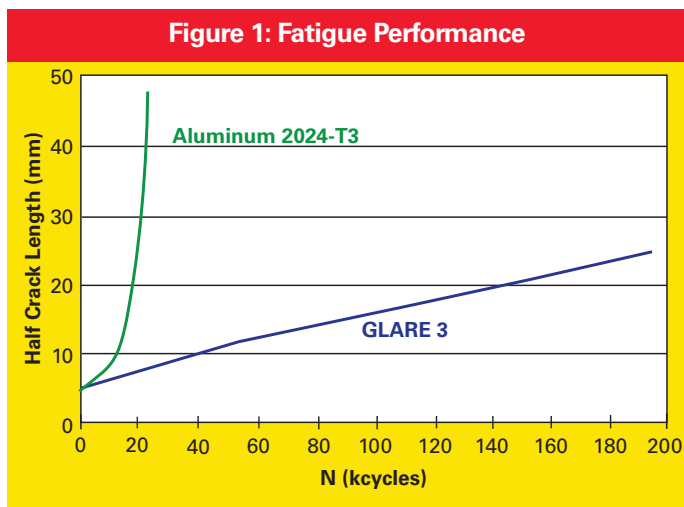


Table 1: Advantages of Fiber-Metal Laminate

Property	GLARE	2024-T3 Aluminum
Weight	0.7 - 0.9	1
Strength	1 - 2	1
Fatigue	3 - 100	1
Damage Tolerance	1 - 2	1
Impact Blast Resistance	2 - 10	1
Flame Resistance	5 - 50	1
Lightning Strike	1.5 - 2.5	1
Thermal Insulation	100 - 150	1
Corrosion Resistance	2 - 10	1
Reparability	1+	1
Maintenance	1+	1

Data for Figure 1 and Table 1 provided by GTM Advanced Structures

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