MECHANICAL PROPERTYIES OF MAGNESIUM ALLOY SHEET REINFORCED BY UNIDIRECTIONAL CARBON FIBER

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1 General Introduction

In the early of 1980s, fiber reinforced metal laminate (FML) structure was proposed to combine the excellent durability and machinability of metal with the superior fatigue and fracture properties offered by fiber reinforced composites [1]. The newly introduced materials, fiber reinforced metal laminates, are high performance laminated structures consisting of alternating thin metal alloy layers (0.2-0.5*mm*) and prepregs of unidirectional or woven fiber layers embedded in an adhesive system. These prepregs can be laid-up in different orientations. A number of researchers have investigated FMLs. Several systems such as GLARE (glass-fiber/aluminum), ARALL (aramid-fiber/aluminum) and CALL (carbon-fiber/aluminum) have been developed. Owing to their outstanding fatigue resistance, high specific static strength, ease of manufacture, excellent impact resistance etc., GLARE has been used to the C-17 aft cargo door and some transport aircraft flooring. Currently GLARE is being considered for use in the manufacture of upper fuselage of the A380 Airbus aircraft [2, 3].

Compared with aluminum alloy commonly used in traditional FML structures, magnesium alloys can offer low density, thirty percent lower than a aluminum alloy. Using magnesium alloy sheets in FML structures leads to a novel FML system [4]. This novel FML system can be expected to be more lightweight. This paper is to describe the mechanical properties of magnesium alloy sheets reinforced by carbon fiber. The novel FML system is constructed using 0.3*mm* thick magnesium sheets made in Yingkuo Yinhe Aluminum-Magnesium Alloy Company of China and unidirectional carbon fiber reinforced epoxy. The composite and magnesium plies is cured for 4h at 80℃. Increasing the number of carbon fiber and metal plies varies the volume fraction of composite. Standard mechanical tests on several groups of specimens are executed. The experimental results are shown and discussed. Some phenomena and conclusions are presented.

References

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