To Investigate the Lap Shear Strength and Durability of Magnesium Alloy and Nickel Plate by Controlling the Adhesion Pro

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ABSTRACT

Two metals are selected in this adhesion study, which are AZ31B magnesium alloy and pure nickel plate. Also, two different type of Epoxy adhesives (DP-460、AV-119) will be used to investigate the effect of joining sheer strength by changing the process parameters (surface pretreatment、pre-curing conditions、working temperature and time、applied load、adhesive thickness 、and cooling methods, etc.). The optical microscope is used to observe the adhesive thickness and fracture surface for further understanding the fracture behavior in adhesion layer. Four adverse environmental conditions are created (pure water、acidic solution、raised temperature、and natural environment) for durability test to simulate the real circumstances. The experiment results shown that metal treated by the grit blasting have better joint strength than the other surface pretreatment method. Hot-plate cooling is also the better way to obtain higher strength. In adhesive thickness aspect, it will deteriorate the strength when the thickness of adhesives is too thick or too thin. Only under the adequate thickness, 300~500 μm, will reach the optimal strength. Under durability environments, the adhesive strength shows the decreased tendency with increasing time, however, the reducing range not too significant and holding on a certain strength level after long aging times, and will not depredate completely. In acidic solution, the strength of all specimens decrease rapidly at short aging period, after that it will also hold on a strength range. Under 82 ℃ temperature environment, the magnesium adhesive bonding specimen with DP-460, the strength did not show any decreasing phenomena at short period of time, after holding for a long time, strength decreased only slightly.

Keywords : AZ31B Magnesium Alloy, Pure Nickel Plate, Adhesion, Process Parameters, Durability Test

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