The Effect of AC Frequency and Weaving Heat Source on the Mechanical Properties of AZ61A Magnesium Alloy Specimens

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ABSTRACT

According to the high development of technology, consumer’ demands for product are changed from function-oriented to appearance design, fine quality, light weight and portability. Also the「Green concept」is highly emphasized in the worldwide. The vehicle industries are selecting light weight materials to fabricate the vehicle to reduce the exhaust gases emission and increase the fuel efficiency. As we know, magnesium alloy exists many excellent characteristics; ex. low specific density, high specific strength and rigidity, good thermal conductivity, high damping capacity, better corrosion resistance, high electromagnetic interference, etc. Based on above reasons, it helps the magnesium alloy to be the dominated material in the new generation. Nevertheless, the HCP crystal structure causes the inferior results of formability and ductility. Therefore, not only improve the properties of material but promote the manufacture processing techniques are important. One of the important techniques is welding technology. Up to now, only few welding papers, which related to magnesium alloy, were reported. Most of them study the welds by laser beam or electron beam machine. In here, we select the most popular welding machine in manufacture industry, gas tungsten arc welding (GTAW), doing this welding research. Hopes that the effects on weld microstructure and mechanical properties by applying the weaving welding heat source and the varying the alternating current (AC) frequency could be revealed, to further understand the behavior of AZ61A magnesium welding. Based on the experiment results shown that the influence of low frequency weaving heat source applied, do not show clear affect to the weld property. However, by changing of the AC frequency did obviously show the influence to the weld. By increasing the AC frequency, the grain refinement effect is very clearly, which will strongly influence the mechanical property and fracture mode of weld. Hopefully, the result of this study not only can accumulate the knowledge of magnesium welding, but also helps the traditional metal working industries to promote their welding skills and expand the applications of magnesium alloy.

Keywords : AZ61A Magnesium Alloy, Weaving Welding, Alternating Current Frequency, Mechanical property.

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