Effect of Pulising Current and Aging Treatment on Microstructure and Mechanical Properties of Rare Earth Magnesium ...

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ABSTRACT

Due to the highly development of technology, consumers have extended the requests of product from functional oriented to higher quality and light weight property. Also, according to the environmental awareness, the material ' s selection, such as reducing pollution emission, improving fuel efficiency and high recycling ratio, are considered to fabricate the products. Therefore, magnesium alloys become the dominant material in new generation. Research was carried out the TIG weld and post-weld heat treatment on yttrium containing AZ80 magnesium alloy plate. By changing the frequency of pulsing current and heat treating parameters, to find the best combination of pulsing frequency and precipitating mechanism enhance the weld quality of this types magnesium alloys. From experimental results shown, with increasing the frequency of pulse current, grain was refined on the fusion zone which will also reveal from the mechanical properties, especially at the frequency of 9 Hz has the best performance than other parameters. Therefore, welds with 9 Hz and 0 Hz frequency were selected to study the difference in the following post-weld aging treatment experiment. Types of precipitates on 0 Hz and 9 Hz aging weld are quite similar. In short aging time, the discontinuous layer-shaped precipitates are able to enhance the hardness and tensile strength of welds, but show inferior influence to elongation. Further increasing the aging time, the short-rod-shaped and mat-shaped precipitates will uniformly precipitate inside the grain, but these precipitates unable to further increase the strength of weld, and the elongation is still decreasing. Based on experimental results, selecting 9 Hz pulse current can obtain better mechanical properties in this rare earth containing AZ80 magnesium alloy TIG weld. For post-weld aging treatment, choosing 400°C- 1 hour for solid solution and following with 200°C- 8 hours for aging treatment, can effectively improve the strength of pulsed weld.

Keywords : AZ80 Rare-earth Magnesium Alloy、Yttrium Element、Gas Tungsten Arc Welding、Frequency of Pulsing Current 、Grain Size、Aging Treatment、Precipitates、Mechanical Properties

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