The Effect of Pulse Current Frequency to Weldment Structure and Mechanical Properties on 6Al-4V Titanium Alloy

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ABSTRACT

According to the highly development of technology, consumers ’ demands for products are not function-oriented anymore, but should take the appearance, quality, light and handy, and the endurance into account. Light metal, therefore, becomes the main stream of material in new age. Although, the specific density of titanium (about 4.50 g/cm3) is heavier than the other two well-known light metals (magnesium and aluminum). However, its outstanding high melting point, high specific strength and rigidity, excellent corrosion resistance, high fatigue strength, high fracture toughness, and biocompatibility, which makes it predominant though. Owing to the increase of demand and promotion of technology, problems of refinement and manufacture skills of Ti in early periods are overcome gradually. It ’ s believed that the development and application of Ti and Ti alloy are infinite in future. To make a material universal application, extra-work skill plays an important role, joint skill in which especially. For there is few research works on joint of Ti alloy in domestic. In this experiment, we select the most widespread-applied 6Al-4V Titanium alloy by means of gas tungsten arc welding (GTAW/TIG) machine doing the research. Hopes that the influence on weld structure and mechanical properties by changing the frequency of pulse could be understood, then obtain the welding characteristics and the best welding parameter. Based on the results of experiment, it proved that no matter use of the alternating current or the direct current, the frequency of pulse do shown the refined effect on the weldment structure, and the alternating current also showed the stronger effects. This refined result will directly affect the mechanical properties and fracture mode of weldment. Thus, selecting the appropriate current type and pulse frequency will apparently promote the nature of weldment. Hopefully, the results of this investigation will be helpful to the industrials and expand the applications of titanium alloy.

Keywords : Light Metals ; Gas Tungsten Arc Welding ; 6Al-4V Titanium Alloy ; Frequency of Pulse ; Fracture Mode

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