Cavitation resistance of welded joints of AlMg4.5Mn alloy

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Abstract

Cavitation resistance of welded joints of the three-component aluminum alloy AlMg4.5Mn was examined in this paper. Tests were performed on samples of welded joints as well as on samples of the base material. Welding was performed by TIG and MIG procedures in a protective atmosphere of pure argon. After the welding, metallographic tests were performed. The ultrasonic cavitation test method with a stationary sample was used to test the resistance to cavitation according standard ASTM G32 [1]. During the test, the change in mass of the samples was monitored in order to determine the cavitation rate. The least squares method was applied, where the slope of the straight line determines the cavitation rate (Fig.1).

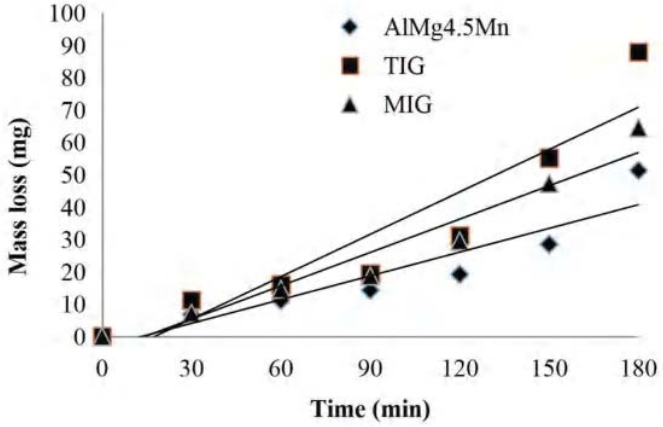

Fig. 1. Cavitation rates of tested samples

The base material of the AlMg4.5Mn alloy has the highest resistance to the effect of cavitation (the lowest total mass loss and the lowest cavitation rate). The welded joint obtained by the MIG process has a higher resistance to the effect of cavitation compared to the sample obtained by the TIG process. This behavior is a consequence of the smaller porosity and finer microstructure of the sample obtained by the MIG process (Fig. 1). The morphology of damage to the surface of samples exposed to the effect of cavitation during testing was monitored using scanning microscopy. It was shown that ductile fracture mechanism was identified for all studied samples together with the presence of small fatigue like craters.

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