Abstract

In this work, the mechanical properties of butt joints of AA1100 Aluminum alloy obtained through FSW in a conventional milling machine and a friction stir welding machine were compared. The joints were obtained using the same tool geometry and welding parameters. The milling machine was adapted to ensure position control during the welding process and the friction stir welding machine was operated under force and position control modes. Mechanical properties of the beads were evaluated through tensile tests and microhardness measurements. Defects generated in the joints were analyzed using optical and scanning electron microscopy. Results showed that mechanical properties were strongly affected by the welding parameters, whereas the kind of machine influenced the presence of defects in the joints. It was found that the tensile properties were more appropriate to compare the results between sets of parameters and level of defects than the hardness test. Higher mechanical properties and a lower level of defects were obtained in the FSW machine by position control mode, with tensile strength around 130MPa, whereas the highest tensile strength obtained in the conventional milling machine was 109 MPa.

Keywords

FSW, mechanical properties, AA1100, adapted FSW machine.