

Abstract

Mahmoud A. El-Sayed

Effect of welding conditions on the mechanical properties of friction stir welded 1050 aluminum alloy

Friction stir welding (FSW) is a relatively new solid-state joining process. This joining technique is energy efficient, environmental friendly, and versatile. In order to demonstrate the friction stir weldability of the 1050-H14 aluminum alloy and determine optimum welding parameters, the mechanical and metallurgical properties of the joints have been studied in this paper. The rotational speed was changed from 900 to 1400 rpm while the traverse speed was varied from 25 to 40 mm min⁻¹. The results showed that all the properties studied were significantly affected by the welding process parameters. Optimized welding conditions of 1400 rpm rotational speed and 25 mm min⁻¹ feed rate resulted in the highest UTS of the FSW joint which was equivalent to 86% that of the base material. Also, the combination of 900 rpm rotational speed and 40 mm min⁻¹ traverse speed resulted in the best joint hardness efficiency of about 83% that of the base metal.