

Robotic FSW for three-dimensional components

Sudarea FSW robotizată pentru componente tridimensionale

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Abstract

This paper presents the development of three-dimensional (3D) friction stir welding (FSW) on a robotic system using two newly developed process variants: floating-bobbin and floating-bobbin FSW. Conventional FSW along curvilinear paths has been successfully demonstrated in the past [1-3]. Floating-bobbin FSW tools have several advantages over conventional tools, especially when implemented on robots. Firstly, the axial process forces which occur between the shoulders of the bobbin tool are symmetric, which means that the actuator, i.e. the industrial robot, is not subjected to any axial process forces. Secondly, the use of a bobbin tool eliminates the need for a backing bar, which is considered one of the major drawbacks of conventional FSW. Although the benefits of floating-bobbin FSW have been demonstrated for linear joint lines [4], the technique has not yet been applied to the production of three-dimensional components by use of a serial kinematics industrial robot. The second technique, stationary shoulder FSW, significantly improves the robot stability and process robustness along 3D paths, with the additional benefit of improved visual properties [5].

Keywords

Robotic Friction Stir Welding (FSW), Floating-bobbin FSW (FBFSW); Stationary Shoulder FSW (SSFSW), three-dimensional (3D)