ABSTRACT

The use of polymeric materials has grown widely in various sectors such as packaging, building, electronic, automotive, and aerospace industries. Particularly, Ultra-High Molecular Weight Polyethylene has wide engineering applications and is used in large quantities in automotive oil pans, gears, slides, cams, bearings, fluid reservoirs, and the sports industry. Friction Stir Welding (FSW) is a solid-state process in joining thermoplastic materials. In this investigation, FSW process must be applied to join a UHMWPE plate of 10 mm thickness with specially designed square tool pin profile. The aim of this study is to examine the effect of main friction stir welding (FSW) parameters on the quality of UHMWPE plate welds. The welding parameters studied were the tool rotational speed which varied between 1300 and 1500 (rpm); the traverse speed which varied between 15 and 25 (mm/min), and the axial force ranging from 8 to 10 (KN). Good quality welds are achieved without using external heating, The hardness angle distortion and bead geometry also evaluated. Taguchi design optimum parameters and ANNOVA were found.

Keywords: *FSW, Tool Profile, Taguchi, HRM, Polyethylene*

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