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Friction Stir Welding of High Density Polyethylene – Carbon Black Composite

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Abstract

This investigation elucidates the important role of process temperatures in the friction stir welding of polymers. Measurements of the material temperatures were performed by means of an infrared camera and embedded thermocouples under the weld line. An inverse heat conduction method was also utilized to determine the temperature distribution in the workpiece numerically. The weld quality was determined in terms of the amount of defects present in the stir zone and the tensile strength of the joint. It was found that considerable melting occurred under the rotating shoulder and on the trailing side of the rotating pin. Movement of the molten material by the rotating tool created macro- and micro-voids in the stir zone. Crystallinity and nano-hardness measurements indicated that crystallinity was higher under the tool shoulder due

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