Exploration on Surface Roughness in Abrasive Water Jet Cutting of AA6063-TiC Composites for Vehicle Structural Applications

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Abstract

This paper deals a set of studies performed on AA6063-TiC composites produced by adding 3%, 6% and 9% wt. of TiC in aluminium alloy 6063 and processed with abrasive water jet cutting that are formed with garnet abrasive of 80 mesh size. These studies are effectively meant to evaluate the surface roughness (Ra) of abrasive water jet cutting on various compositions of AA6063-TiC produced by stir casting route. Abrasive water jet cutting was carried out on cylindrical samples of various compositions of AA6063-TiC composites by varying traverse speed, stand-off distance and abrasive flow rate at three different levels. The experiments were performed using Taguchiâ€™s L27 orthogonal array. Contribution of these parameters on the Ra was determined by ANOVA and regression analysis to optimize the process parameters for effective machining. Among the interaction effects, traverse speed and stand-off distance combinations contribute more to the Ra. The microstructures of machined surfaces were also analysed by scaning electron microscope images and F-profile plots.

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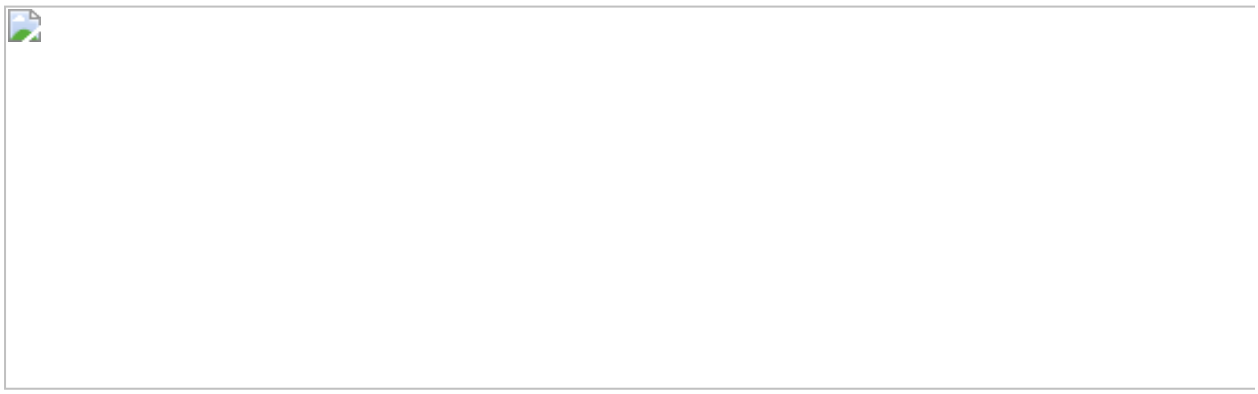

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