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Optimization of multiple quality characteristics of EDM process for MRR and TWR using utility concept

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ABSTRACT

Electrical discharge machining (EDM) researchers have explored a number of ways to improve the material removal rate (*MRR*) in order to meet the industrial need for fulfilling market demand. Tool wear rate (*TWR*) is also one of the important performance measures in EDM amongst other measures such as metal removal rate and surface roughness. In most EDM operations, the contribution of the tool cost to the operational costs is more than 70 %. As a consequence, the wear of the tool should be carefully taken into consideration when planning and designing EDM operations. Despite a range of different approaches, this new research shares the same objective of achieving more efficient material removal coupled with a simultaneous reduction in tool wear. This study reports on an investigation into the optimization of the die sink EDM process on EN31 die steel. Taguchi's method with multiple performance characteristics has been adopted to obtain an overall utility value that represents the overall performance of die sink EDM. The six input parameters are optimized by considering multi-performance characteristics including *MRR* and *TWR*. The predicted optimal values for *MRR* and *TWR* obtained for die sink EDM are 0.2421 g/min and 0.0087 g/min, respectively. The results were verified by conducting confirmation experiments.

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