Multi Response Optimization in Drilling Al6063/SiC/15% Metal Matrix Composite

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Abstract : This investigation proposes a grey-based Taguchi method to solve the multi-response problems. The grey-based Taguchi method is based on the Taguchi's design of experimental method, and adopts Grey Relational Analysis (GRA) to transfer multi-response problems into single-response problems. In this investigation, an attempt has been made to optimize the drilling process parameters considering weighted output response characteristics using grey relational analysis. The output response characteristics considered are surface roughness, burr height and hole diameter error under the experimental conditions of cutting speed, feed rate, step angle, and cutting environment. The drilling experiments were conducted using L27 orthogonal array. A combination of orthogonal array, design of experiments and grey relational analysis was used to ascertain best possible drilling process parameters that give minimum surface roughness, burr height and hole diameter error. The results reveal that combination of Taguchi design of experiment and grey relational analysis improves surface quality of drilled hole.