

## Study of ECG process while machining $Al_2O_3/Al$ – IPC using grey-Taguchi methodology

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### ABSTRACT

The present paper attempts to optimize machining parameters of electrochemical grinding (ECG) while machining alumina-aluminum interpenetrating phase composites by Grey-Taguchi methodology. Control parameters like electrolyte concentration, voltage, depth of cut and electrolyte flow rate have been considered to ensure two conflicting responses – higher material removal rate and lower surface roughness simultaneously by a single parametric combination. The  $L_9$  orthogonal array design is followed for the purpose of experimentation. The well-known S/N ratio analysis is performed along with ANOVA to establish the prominent variables that govern the responses separately. Finally Grey Relational Analysis is performed to optimize multiple performances in which different levels combinations of the factors are ranked based on grey relational grade. Surface roughness is given more importance than the *MRR* considering basic objective of the process. The analysis reveals that substantial improvement in machining performance takes place following this technique. The experimental investigation approach for evaluating the optimum ECG parametric combination during machining of composites materials can act as useful and an efficient guideline for manufacturing of products using such material. The study highlights the effects of different process variables on multiple performances for complex process like ECG.

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