

Multi-Response Optimization of CNC Milling Parameters Using Taguchi Based Grey Relational Analysis for AA6061 T6 Aluminium Alloy

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Abstract : This paper presents a study of the grey-Taguchi method to optimize CNC milling parameters of AA6061 T6 aluminium alloy. Grey-Taguchi method combines Taguchi method based design of experiments (DOE) with grey relational analysis (GRA). Multi-response optimization of different quality characteristics as surface roughness, material removal rate, cutting forces is done using grey relational analysis (GRA). The milling parameters considered for experiments include cutting speed, feed per tooth, and depth of cut. Each parameter with three levels is selected. A grey relational grade is used to estimate overall quality characteristics performance. The Taguchi's L9 orthogonal array is used for design of experiments. MINITAB 17 software is used for optimization. Analysis of variance (ANOVA) is used to identify most influencing parameter. The experimental results show that grey relational analysis is effective method for optimizing multi-response characteristics. Optimum results are finally validated by performing confirmation test.

Keywords : ANOVA, CNC milling, grey relational analysis, multi-response optimization

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