عنوان مقاله:

Analysis of surface roughness and material removal rate in machining of AISI ۱۰۴۰ steel using CNC turning process

محل انتشار:

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خلاصه مقاله:

The present study investigates the effect of turning process parameters on the surface roughness and metal removal rate (MRR) of the AISI ۱۰۴۰ steel. Twenty-seven (L۲۷) runs based on an orthogonal array of Taguchi techniques were performed and the grey relational analysis method was later applied to determine a most favourable turning parameters setting. Apart from this, the analysis of variance (ANOVA) was conducted to statically identify the effect of the most significant parameters. Cutting speed, feed, depth of cut, and nose radius were carefully selected as input parameters, while surface roughness and material removal rate (MRR) was output respectively. Various plots and curves have been drawn to identify the effect of various parameters on surface roughness, material removal rate, and grey relational grade. From the result, it was observed that the Taguchi-based grey relational analysis approach can be effectively used as a structured method to optimize the parameters. The results of the range analysis show that the cutting speed has the most significant effect, followed by the feed rate and depth of cut.

کلمات کلیدی:

Turning, grey-relation analysis (GRA), Taguchi technique, optimization, ANOVA, Surface roughness, MRR