

Research and modelling of surface roughness, cutting forces and I-kaz coefficients for S42C in turning using response surface methodology

ABSTRACT

This paper presents the optimization in machining processes on the cutting parameters for the S45C in turning process using the response surface method (RSM). The experimental work conducted investigates the influence of cutting parameters on statistical analysis of signals and surface quality. The paper also presents a statistical analysis of signal processing. The cutting force was measured during machining using the Kistler 9129AA dynamometer to monitor the force signals and the data was analyzed using the I-kazTM method of statistical analysis. This statistical analysis was used to assess the effect of force signals during the machining process. The RSM models for Ra and Rz, and I-kaz coefficients (Z) have been developed with ANOVA and multiple regression equations. The models also were compared and validated with the predicted and measured of Ra and Rz values, and I-kaz coefficients. The optimal configuration of cutting parameters was observed at 200 m/min, 0.1 mm/rev and 0.521 mm with desirability of 95.9%. It is observed that the models developed are suggested to be utilized for predicting surface roughness values and I-kaz coefficients for the machining of S45C steel.

Keyword: Cutting force; I-kazTM; Response surface methodology; Surface quality; Turning