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ANALYSIS AND OPTIMIZATION OF CUTTING PARAMETERS FOR THE SURFACE ROUGHNESS OF EN-19 ALLOY STEEL

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Surface roughness is the most critical parameter measured in mechanical products. The present work discusses the influence of cutting parameters on surface roughness of EN-19 alloy steel. Response Surface methodology is used to get the optimal value of these parameters. A plan of experiment based on central composite design is used to make design matrix. Analysis of variance (ANOVA) is employed to investigate the cutting characteristics of work material. The experiment was performed on CNC lathe machine and cutting tool material was coated CNMG carbide bit. The objective was to establish a correlation between cutting speed, feed, depth of cut, tool nose radius with surface roughness in work piece. A second order response surface model for the surface roughness is developed for the surface roughness. The predicted values by the model are fairly close to the observed, which indicates that the model can be used to predict the surface roughness on EN-19 within the range of parameter studied. 3-D plots are generated to predict the value surface roughness at any zone of experimental area. It is observed that surface roughness decreases with increases in cutting speed, tool nose radius and it increases with feed. Depth of cut has very small effect. Feed rate affect the surface roughness most.

Keywords: central composite design, analysis of variance, surface roughness.