Application of Taguchi Method and Surface Response Methodology to Evaluate Of Mathematical Models to Chip Deformation when Drilling With Coated and Uncoated Twist Drills

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The paper deals with the methodology and suitability of mathematical models applying analysis of the signal-to-noise (S/N) ratio as well as analysis of variance (ANOVA) and surface response methodology (RSM) on effect of TiAlN coating on chip ratio when drilling with HSS Co5 twist drill with diameter of 8 mm. Experimental work was performed according to design of experiment (DoE) Taguchi method. Cutting speed v_c (m/min) and feed f (mm/rev) were selected as control factors in three levels and chip ratio K was used as a response variable. The main aim of this study is to establish relevant methodology for short term testing and find adequate mathematical model for chip ratio parameter $K = f(v_c, f)$ as a function of cutting condition when drilling with PVD coated and uncoated tool. Statistical software Minitab 14 was employed to process and evaluate of experimental data. The effect of feed and cutting speed on chip ratio was investigated through analysis of the signal-to-noise (S/N) ratio and analysis of variance. Equations for chip ratio K as a function of control factors were developed.

Keywords: chip ratio, drilling, Taguchi method, RSM, ANOVA, mathematical models

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