Prediction Model Development for Material Removal Rate in Band Sawing Using Dimensional Analysis Approach

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Abstract:

Bandsawing is an accurate and fast process to cut various raw materials. Material removal rate (MRR) is the important parameter in bandsawing to judge its performance. To the best of knowledge of the author, almost none of the researchers has developed semi empirical model to study combined effect of process, material and machine parameters for bandsawing process. Hence, in the present research work, semi empirical model is developed for MRR using dimensional analysis approach. In this work, Taguchi's technique is used to conduct experiments. As per ANOVA, feed (58%), speed (17.44%) and top arm angle (13.55%) found as significant parameters. The model is formulated as a function of these parameters and validated calculating mean error (0.024), root mean square error (0.029) and percentage average error (6.63%). The model is verified by randomly substituting the values from experiment data set. The predicted results were found in close agreement with the experiment results.

Keywords:

Bandsaw Machine, Material Removal Rate, MRR, Taguchi Method, Dimensional Analysis, Buckingham Pi Theorem

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