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Optimizing Cylindrical Grinding Proficiency and Surface Finish for EN24 Steel Alloy with the Use of Taguchi Analysis and Artificial Neural Network

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Abstract: *Grinding is a material removal procedure used at the end of manufacturing to obtain high dimensional precision and a desirable surface polish. External cylindrical grinding is a type of grinding procedure that used to grind cylindrical things such as engine shafts, connecting rods, spindles, and axles. This study examines how control settings affect response parameters using EN24 alloy steel on a cylindrical grinding machine. Response parameters are material removal rate (MRR) and surface roughness (Ra), whereas control parameters are workpiece speed (v), feed rate (f), and depth of cut (d). Taguchi DOE is employed with L16 orthogonal array to optimize control parameter levels, followed by cylindrical grinding tests.An artificial neural network (ANN) model was created to validate and predict cylindrical grinding reaction parameters. To train the network, experimental data was used, and ANN predictions were compared to real data. Data collection has also completed.In the purposed work minimum Ra is 0.52 µm and maximum MRR is 0.6588 g/sec found and results indicate that feed rate and workpiece speed are the most dominating parameters of cylindrical grinding. The experimental results can be employed by various manufacturing and industrial firms and they can select suitable combinations of input parameters for desired Ra and MRR.*

Keywords: Cylindrical grinding, Surface roughness, Material removal rate, Taguchi method, artificial neural network