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Analysis of Surface Grinding Response Parameter for EN31 Alloy Steel using Taguchi Methodology & Artificial Neural Network and Compression with Cylindrical Grinding Performance Parameter

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Abstract: *Surface finish is extremely important in the manufacturing industry, because getting the correct surface quality is critical. Industries use grinding operations to achieve the desired surface polish on products. Grinding techniques include surface grinding, cylindrical grinding, centerless grinding, and creep-feed grinding. Cylindrical grinding is a machining technique used to refine the external surface of a workpiece. This process involves rotating the workpiece on its axis as a grinding wheel meticulously eliminates material, resulting in the ideal form, size, and surface texture. The work material used in these trials is EN31 steel, which is frequently used in the automobile industry to produce shear blades, molding dies, bolts, and cutting tools. Performance metrics including surface roughness and metal removal rate are assessed using three input parameters: wheel speed (V), depth of cut (D), and number of passes (N) throughout different ranges. Artificial Neural Network (ANN) study carried out in MATLAB software and Taguchi Design utilizing MINITAB are used to discover optimal performance parameters. The ANN receives its input data from the Taguchi method. The lowest surface roughness (Ra) of 0.12000 µm and the highest metal removal rate of 0.83406 grm/sec are shown by the results. Notably, the two most important variables in the surface grinding process are wheel speed and number of passes*

Keywords: Surface Grinding Machine, surface roughness, MRR, Taguchi Method, Wheel speed, cutting depth, and number of passes