

Modeling and optimization of finish diamond turning of spherical surfaces based on response surface methodology and cuckoo search algorithm

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ABSTRACT

Surface roughness is one of the most significant factors to indicate the product quality. Diamond turning is an efficient and highly accurate material removal process to improve the surface quality of the workpiece. In the present study, the arithmetic mean absolute roughness (R_a) and total height of profile (R_t) of spherical surface during finish turning of a commercial brass alloy CuZn40Pb2 were modeled using Response Surface Methodology (RSM). The experimental investigations were carried out using the Central Composite Design (CCD) under dry conditions. The effect of cutting parameters such as spindle speed, feed rate and depth of cut) on spherical surface quality was analyzed using analysis of variance (ANOVA). A cuckoo search (CS) algorithm was used to determine the optimum machining parameters to minimize the surface roughness. Finally, confirmation experiments were carried out to verify the adequacy of the considered optimization algorithm.

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