

Improvement of surface finish by ball burnishing: approach by fractal dimension

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Abstract: The surface roughness significantly affects the quality of parts and their functional properties such as contact surface, as well as coating adhesion. The machined surface quality is evaluated by arithmetic deviation R_a which does not suffice to describe the surface irregularities. In order to apprehend these deficiencies a new technique based on fractal geometry was introduced. To apply this concept an experimental work was carried out to characterise surface quality by fractal dimension 'D'. The operations of burnishing ball were performed according to plans of experiments of 'Box-Behnken', an optimal regime was obtained and a mathematical model was cleared for predicting the fractal dimension 'D' as a function of treatment regime parameters. Furthermore, the application of optimal regime under several passes 'i' has enabled to examine the evolution of 'D'. The results confirm that fractal dimension 'D' has impact on surface quality and tribological parameters.

Keywords : roughness, fractal dimension, Burnishing process, Designs of experiments