

Surface Roughness Modeling in Dry Face Milling of Annealed and Hardened AISI 52100 Steel

Authors : Mohieddine Bengersallah, Mohamed Zakaria Zahaf, Ali Medjber, Idriss Tibakh

Abstract : The objective of this study is to analyse the effects of cutting parameters on surface roughness in dry face milling using statistical techniques. We studied the effect of the microstructure of AISI 52100 steel on machinability before and after hardening. The machining tests were carried out on a high rigidity vertical milling machine with a 25 mm diameter face milling cutter equipped with micro-grain bicarbide inserts with PVD (Ti, AlN) coating in GC1030 grade. A Taguchi L9 experiment plan is adopted. Analysis of variance (ANOVA) was used to determine the effects of cutting parameters (V_c , f_z , a_p) on the roughness (R_a) of the machined surface. Regression analysis to assess the machinability of steel presented mathematical models of roughness and the combination of parameters to minimize it. The recorded results show that feed per tooth has the most significant effect on the surface condition for both steel treatment conditions. The best roughnesses were obtained for the hardened AISI 52100 steel.

Keywords : machinability, heat treatment, microstructure, surface roughness, Taguchi method

Conference Title : ICCRM 2019 : International Conference on Changeable and Reconfigurable Manufacturing

Conference Location : Dublin, Ireland

Conference Dates : May 07-08, 2019