

Optimization of Surface Finish in Milling Operation Using Live Tooling via Taguchi Method

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Abstract : The main objective of this research is to optimize the surface roughness of a milling operation on AISI 1018 steel using live tooling on a HAAS ST-20 lathe. In this study, Taguchi analysis is used to optimize the milling process by investigating the effect of different machining parameters on surface roughness. The L₉ orthogonal array is designed with four controllable factors with three different levels each and an uncontrollable factor, resulting in 18 experimental runs. The optimal parameters determined from Taguchi analysis were feed rate – 76.2 mm/min, spindle speed 1150 rpm, depth of cut – 0.762 mm and 2-flute TiN coated high-speed steel as tool material. The process capability Cp and process capability index Cpk values were improved from 0.62 and -0.44 to 1.39 and 1.24 respectively. The average surface roughness values from the confirmation runs were 1.30 µ, decreasing the defect rate from 87.72% to 0.01%. The purpose of this study is to efficiently utilize the Taguchi design to optimize the surface roughness in a milling operation using live tooling.

Keywords : live tooling, surface roughness, taguchi analysis, CNC milling operation, CNC turning operation

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