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Optimization of the cutting parameters for the cutting forces and surface roughness in Inconel 625 super alloy based on the taguchi method

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In this study, were determined the effects of cutting tool coating material and cutting speed on cutting forces and surface roughness based on Taguchi experimental design. For this aim, Aeroscape material, nickel based super alloy Inconel 625 is machined at dry cutting conditions with three different cemented carbide tools namely Physical Vapor Deposition (PVD) coated with TiN/TiCN/TiN; Chemical Vapor Deposition (CVD) coated with TİN+AL2O3-TİCN+TİN; and WC/CO on CNC lathe. Metal removing process is carried out at four different cutting speeds (50, 65, 80, 100 m/min.) while 1.5 mm depth of cut and 0.10-0,15 mm/rev. feed rate are to be constant. Main cutting force, Fz is considered to be cutting force as a criterion. The results show that hardening of material increased by machining up. Mechanical loading and abrassivenes of the carpide particles has increase effect on cutting forces and in addition, the effect of cutting speeds was not important in the analysis of variance. Cutting force (Fx) and surface roughness (Ra) decreases with improving work-piece material machinability. In the experiments, depending on the tool coating material, lowest main cutting force is found to be 548 N and Lowest average surface roughness (0.812 μm) both at 100 m/min with multicoated cemented carbide insert KC9240 and KT315 respectively. The results obtained indicated that CVD cutting tools performed better than PVD and uncoated cutting tools according to cutting forces,but in terms of surface quality and cutting forces KT315 shoved better performance with current parameters.

Biography

Abdullah is a Assistant Proffessor in Van Vocational of Higher School Mechanical and Metal Technology Department, from Van Yuzuncu Yıl University in Turkey. His field of study is Manufacturing and Construction and has been working on CAD/CAM (Computer Aid Design/ Computer Aid Manufacture), Solidedge, MasterCAM and Production Techniques. He has been in Germany Zittau-Gorlitz University- Mechanical Engineering Department for research and access to training in CAD/CAM by Erasmus Peoject. And he has also been İnvitated for teaching Staff Mobility By Erasmus Program to France University of Lorraine, Mechanical Engineering Department in May 2013. Since 1996 he is working in Yuzuncu yıl University as a Lecturer and then as an Assistant Proffessor. Presently he is the Head of Department.

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