

5th International Conference and Exhibition on

MECHANICAL & AEROSPACE ENGINEERING

October 02-04, 2017 Las Vegas, USA

The machining of Haynes 188 nickel based aerospace material with ceramic cutting tool

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In this study, we investigated the effects of cutting speed on cutting forces and surface roughness based on Taguchi experimental design. The effects of machining parameters were investigated using Taguchi L18 orthogonal array. Optimal cutting conditions were determined using the signal-to-noise (S/N) ratio which is calculated for average surface roughness and cutting force according to the "the smaller is better" approach. Using results of analysis of variance (ANOVA) and signal-to-noise (S/N) ratio, effects of parameters on both average surface roughness and cutting forces were statistically investigated. Three different cutting tools were used in experiments as KYON 4300, KYS 25 and KYS 30. Main cutting force, F_z is considered to be cutting force as a criterion. In the experiments, depending on the tool material, lowest main cutting force 592 N at 260 m/min and lowest average surface roughness (0.424 μm) at 230 m/min with KYS25 ceramic tool was found. While cutting speed and feed rate has higher effect on the cutting force, the feed rate and cutting speed has seen higher effect on average surface roughness. In the cutting force and surface roughness turning tests, the KYON 4300 cutting tool has seen better performance than the other cutting tools.

Biography

Abdullah Altin is an Assoc. Professor Doctor in Van Vocational of Higher School, Mechanical and Metal Technology Department, at Van Yuzuncu Yil University in Turkey. His field of study is Manufacturing and Construction and has been working on CAD/CAM (computer aid design/computer aid manufacture), solid edge, master cam and production techniques. He has been in Germany Zittau- Gortitz University Mechanical Engineering department for research and access to training in CAD/CAM by Erasmus Project. And he has also been invited for teaching Staff Mobility by Erasmus program to France, Nancy University of Lorraine and France-University of Belfort, Mechanical Engineering Department in May 2013 and in May 2016. Since 1996, he is working at Yuzuncu Yil University as a Lecturer and then as an Assoc. Professor Doctor. Presently, he is the Head of the Department.

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