World Academy of Science, Engineering and Technology
International Journal of Aerospace and Mechanical Engineering
Vol:9, No:12, 2015

Effect of Vegetable Oil Based Nanofluids on Machining Performance: An Experimental Investigation

Authors : Krishna Mohana Rao Gurram, R. Padmini, P. Vamsi Krishna

Abstract : As a part of extensive research for ecologically safe and operator friendly cutting fluids, this paper presents the experimental investigations on the performance of eco-friendly vegetable oil based nanofluids in turning operation. In order to assess the quality of nano cutting fluids used during machining, cutting temperatures, cutting forces and surface roughness under constant cutting conditions are measured. The influence of two types of nanofluids prepared from nano boric acid and CNT particles mixed separately with coconut oil, on machining performance during turning operation is examined. Comparative analysis of the results obtained is done under dry and lubricant environments. Results obtained using cutting fluids prepared from vegetable oil based nanofluids are encouraging and more pronouncing by the application of CCCNT at machining zone. The extent of improvement in reduction of cutting temperatures, main cutting force, tool wear and surface roughness is tracked to be 13%, 37.5%, 44% and 40% respectively by the application of CCCNT compared to dry machining.

Keywords : nanoparticles, vegetable oil, machining, MQL, surface roughness
Conference Title : ICAMAME 2015 : International Conference on Aerospace, Mechanical, Automotive and Materials Engineering
Conference Location : Sydney, Australia
Conference Dates : December 10-11, 2015