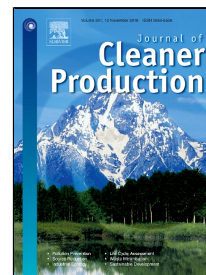


# Accepted Manuscript

Hard machining performance of indigenously developed green cutting fluid using flood cooling and minimum quantity cutting fluid



Kishor Kumar Gajrani, P.S. Suvin, Satish Vasu Kailas, Mamilla Ravi Sankar

PII: S0959-6526(18)32907-X  
DOI: 10.1016/j.jclepro.2018.09.178  
Reference: JCLP 14313  
To appear in: *Journal of Cleaner Production*  
Received Date: 06 November 2017  
Accepted Date: 21 September 2018

Please cite this article as: Kishor Kumar Gajrani, P.S. Suvin, Satish Vasu Kailas, Mamilla Ravi Sankar, Hard machining performance of indigenously developed green cutting fluid using flood cooling and minimum quantity cutting fluid, *Journal of Cleaner Production* (2018), doi: 10.1016/j.jclepro.2018.09.178

This is a PDF file of an unedited manuscript that has been accepted for publication. As a service to our customers we are providing this early version of the manuscript. The manuscript will undergo copyediting, typesetting, and review of the resulting proof before it is published in its final form. Please note that during the production process errors may be discovered which could affect the content, and all legal disclaimers that apply to the journal pertain.

# Hard machining performance of indigenously developed green cutting fluid using flood cooling and minimum quantity cutting fluid

Kishor Kumar Gajrani<sup>1</sup>, P.S. Suvin<sup>2</sup>, Satish Vasu Kailas<sup>3</sup>, Mamilla Ravi Sankar<sup>1\*</sup>

<sup>1</sup>Department of Mechanical Engineering, Indian Institute of Technology Guwahati, Guwahati-781039, India

<sup>2</sup>Centre for Product Design and Manufacturing, Indian Institute of Science Bangalore, Karnataka-560012, India

<sup>3</sup>Department of Mechanical Engineering, Indian Institute of Science Bangalore, Karnataka-560012, India

\*Corresponding author E-mail: [evmrs@iitg.ernet.in](mailto:evmrs@iitg.ernet.in)

## Abstract

Cutting fluids play a vital part in turning process. Basically, these cutting fluids are made up of mineral oil (MO) and performance enhancing additives that are produced chemically. However, MO has adverse environmental effects and causes health hazards. Therefore, MO is gradually replaced by green cutting fluid (GCF). Indigenously developed environmental friendly vegetable based GCF with minimum quantity cutting fluid (MQCF) can serve as a viable solution to make current work a cleaner process. In this present study, vegetable-based GCF was synthesised and characterized. Emulsion stability and anti-corrosion properties of GCF were investigated. MQCF machining process parameters such as cutting fluid emulsion composition, stand-off distance and nozzle spray angle were experimentally optimized to extract better output. Hard machining experiments were performed with developed GCF using flood cooling (FC) and MQCF techniques during turning of hardened AISI H-13 steel. For comparison, dry machining experiments were also carried out. Cutting force, feed forces, centre line average (CLA) surface roughness of workpiece were measured and the coefficient of friction was calculated. After machining, cutting tool rake face morphology and wear characteristics were studied using field emission scanning electron microscope, optical microscope and non-contact 3D surface profilometer. Result shows that cutting force, feed force, coefficient of friction and CLA surface roughness of workpiece were reduced using

Download English Version:

<https://daneshyari.com/en/article/11019721>

Download Persian Version:

<https://daneshyari.com/article/11019721>

[Daneshyari.com](https://daneshyari.com)