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Influence of Nano graphite based Vegetable oils as Cutting Fluids for Mild Steel Drilling

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ABSTRACT

In last decades, a considerable attention is received by non-edible vegetable oils as Bio lubricant due to their eco-friendly products, increased remarkable improved tribological characteristics and as they are renewable sources. In this work, different vegetable oils namely Neem, sunflower, coconut, Karanja (Honge) and Neem oil (50% Neem & 50% Karanja) blend are used as cutting fluid for the drilling of Mild steel. The same vegetable oils with addition of Nano graphite powder are also used as Nano based bio-oils in the second stage experimentation. The effect on parameters of these cutting fluids like cutting temperature, cutting force, tool wear, chip formation, drilled hole surface roughness are studied. The results obtained are compared with petroleum based cutting fluids and at dry conditions. From the results, it is observed that the blend of 50% Neem and 50% Honge and sunflower oil is the best cutting fluid compared to other cutting fluids used in this work, more over these oils are environmentally friendly, non-hazardous ,bio-degradable and economical.

Keywords: Mild Steel, Neem, sunflower, coconut, Karanja (Honge) and Neem oil (50% Neem & 50% Karanja) blend, Nano graphite powder

I. INTRODUCTION

During machining operation, relative motion between work piece and cutting tool produces the friction, resulting to generation of high temperature at the interface between tool- work piece and tool-chip. The heat generated decreases tool life, increases surface roughness and decreases the dimensional sensitiveness of work material. This case is more important when machining difficult-to-cut materials as heat would be observed. Various methods have been reported to protect cutting tool from the generated heat. Choosing coated cutting tools are an expensive alternative and generally it is a suitable approach for machining some materials such as titanium alloys, heat resistance alloys etc. The application of cutting fluids is another alternative that can be used to increase the tool life and also higher material removal rates can be achieved which is as shown in figure 1.