

Review on Turning Process of Hard Material with Cutting Fluid

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Abstract

In the beginning coconut oil are used without containing Nano cutting particles, this trends is nowadays getting older to get better surface finish and lower flank wear. This also leads to improve in quality and to stand in competitive market strategies. This paper is focused on recent research in turning process and their significant change in parameters of machining process. Performance of the coconut oil is identified on the basis of flank wear, surface roughness and cutting temperature while machining. Coconut oil is also ecofriendly and has better thermal and oxidative properties. Nano particle use in cutting fluid increases heat carrying capacity which carry away all or most part of the heat generated at tool work interface.

Keywords- Nano Particle, Coconut Oil, Turning Process, Surface Roughness And Flank Wear.

I. Introduction

As far as machining process is concern most widely used process is turning process which most common found in the field of mechanical, electrical and other engineering branch are concern. To improve performance of turning process research made are discussed in this paper. In this paper turning process carried out with different cutting fluids are discussed and their performance improvement and advantages are discussed. It also focuses on the new immerging trends of machining which are popular. Performance of the machining are examined with help of certain parameters like flank wear, surface roughness and tool temperature. These parameters are must be within permissible limit for industrial as well as commercial use components are concern. Cutting environment is most affect machining process for that different cutting fluid are used to improve the performance. Cutting fluid not only improves above parameters it also improve thermal and oxidative properties.

II. Background

Time study and cutting force were examined by Vamsi [4] when he has carried out the research in machining. He has taken solid lubricants graphite and boric acid in SAE 40 oil to carry out for investigation and measured the time taken by all the machining and compared them. Tool used with thermocouple measured the tool temperature to identify cutting temperature. He has compared conventional fluid with his investigation and concluded that boric acid and graphite are more efficient than them. He also found improved quality of product with considerable decrease in surface roughness. Percentage of the graphite in SAE 40 oil best performance found in 20% graphite in SAE 40 oil. This research also lead to use the cutting fluid in liquid form is better due to decrease in surface roughness of the work piece.

Before one decade, machining carried out for austenitic steel AISI 1010 with three different tools to identify the tool selection [1]. Cemented carbide tool used for machining are one carbide tool and other two are coated with Al_2O_3 and TiN. Mainly this study achievement was lower the chip ratio showing less strain instead of bulk strain. This result in tangential force in all experimental condition is higher than other forces. It also concluded that when cutting speed

increase then it also affect the quality of product and increase the surface roughness. High productivity obtained in cutting speed and feed rate of 280 m/min and 0.28 mm/rev. Research given result says that the carbide coated tool are better performance and this lead to better surface finish and lower in flank wear.

Jaydas [2] has investigated different cutting fluid coconut oil, sesame oil, sunflower oil and 2T oil for best thermal and oxidative properties. Comparison carried out with the help of TGA (Thermo- Gravimetric Analysis). Temperature of cutting tool measured to draw the TGA curve and compared with different cutting fluids on TGD (Derivative Thermo-Gravimetric Analysis). Also change of mass studied when antioxidant are added to cutting fluid. Coconut oil shows less thermal stability then other vegetable oil due to less fatty acid and less weight gain while ant oxidative environment. Research leads use eco-friendly coconut oil for better surface finish

Software implementation and identifying affecting machining in percentage wise analysis carried out in ANOVA [3]. Performance of coconut oil was examined to have less surface roughness and flank wear. Performance investigated that effect of different parameters cutting speed, feed rate, depth of cut are 46.49%, 38.73, and 10.73% respectively. Coconut oil is selected because of thermal and oxidative properties. ANOVA analysis also give preference while changing the cutting parameters that will affect the performance of the cutting tool

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Cutting fluid used while machining is essential when they are applied they may react with work or at high temperature it may produce gas. Cutting fluid used must be eco-friendly and user friendly to overcome hazards and accident [5].

Focusing on that Nano cutting fluid is prepared for machining the AISI 1040 to identify its thermal conductivity, specific heat, and heat transfer co-efficient with variation in suspended Nano boric acid percentage in different cutting oil. 0.5% Nano boric acid best suited for considerable decrement in surface roughness and cutting temperature.

Coconut oil and SAE 40 oil are investigated with suspension of Nano boric acid with varying percentage of it by [6]. This investigation was carried out to increase the heat carrying capacity of cutting fluid from cutting zone. Variation in percentage of Nano boric acid gives difference in surface roughness, cutting temperature and flank wear. Cutting fluid with 0.5% Nano boric acid suspension was found the best among variation taken in investigation. In this investigation also found that SAE 40 oil is better without Nano boric acid and coconut oil shows better performance than SAE 40 oil. Coconut oil also shows its best performance with Nano boric acid while machining AISI 304 Austenitic stainless steel [7]. Suspension of Nano particle of boric acid increase thermal conductivity and heat transfer co-efficient while machining. Increase in percentage of Nano boric acid in coconut oil surface roughness, flank wear, and tool temperature is decrease compare to base oil and among all the investigation 0.5% suspension performs best.

III. Methodology

Thermal and oxidative properties of coconut oil are best suited for further research work in hard machining process. Nano particle gives improvement in heat carrying capacity to carry away heat generated while machining. Hard material like austenitic steel need better cutting condition for machining process this cutting fluid will be efficient in working. Key features of coconut oil are oxidative, thermal stability, ecofriendly and user-friendly.

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