2nd International Conference on Current Research Trends in Engineering and Technology
© 2018 IJSRSET | Volume 4 | Issue 5 | Print ISSN: 2395-1990 | Online ISSN : 2394-4099
Themed Section: Engineering and Technology

Review Paper of Turning Process on conventional lathe

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ABSTRACT

Initially, the machining processes like turning use conventional cutting fluids to have better performance. But as the severity of cutting operations increases, the complexity also increases and hence user friendly and eco-friendly cutting fluids are used. Using such cutting fluids give better performance and better heat dissipation which protects the work piece and tool from overheating. From earlier research, for the above purposes, coconut oil works better as it has higher oxidative and thermal properties. While machining hard material like Mild steel, stainless steel, copper, etc. The coconut oil can be used with nano particles which helpful for better heat dissipation . This investigation deals with the surface roughness of work and lathe error.

Keywords: Turning Process, Surface Roughness, Lathe Error, cutting fluid.

I. INTRODUCTION

In engineering, the most commonly used machining process is turning. The research on how to improve the performance of turning process is presented in this paper. It discusses the performance improvement of turning process carried out with different fluids along with their advantages and also the new emerging trends of machining.

The performance of machining is examined by parameters like surface roughness and tool temperature. For industrial and commercial use, these parameters must be within the permissible limit. Cutting environment also affects the machining processes and its performance can be improved by different cutting fluids. Apart from the above parameters, thermal and oxidative properties can also be improved by cutting fluids.

One such eco-friendly and user friendly cutting fluid is coconut oil as it has oxidative properties and higher heat carrying capacity.

II. BACKGROUND

Time study and Cutting forces were examined by Vamsi[4] who did research in machining. He took solid lubricants: graphite and boric acid in SAE 40 oil to investigate and measured the time taken by all the machining and compared them. He used the tools along with thermocouple to measure the tool temperature and identify the cutting temperature.

Comparing his investigation with conventional fluids, he concluded that boric acid and graphite are more efficient than them. He also found out that the

product's quality improved and its surface roughness also considerably reduced. 20% of the graphite is found in SAE 40 oil. This research also concluded that using cutting fluid in liquid form decreased the surface roughness of the work piece, hence is better to use it in liquid form.

One decade ago, for tool selection[1], machining was done on austenitic steel AISI 1010 with three different cemented carbide tools. From three, one is a carbide tool and other two tools are coated with Al2O3 and TiN. It is seen that the chip ratio lowers and shows less strain instead of bulk strain. This result in tangential force is higher than other forces in all experimental conditions. It also concluded that the quality of product is affected when cutting speed increases which also increases the surface roughness. When the cutting speed is 280 m/min and feed rate is 0.28 mm/rev., high productivity is obtained. The research proved that the carbide coated tool performs better leading to reduced flank wear and better surface finish.

Jaydas[2] has investigated different cutting fluids namely coconut oil, sunflower oil,sesame oil and 2T oil for best oxidative and thermal properties. Comparison was carried out with the help of TGA (Thermo- Gravimetric Analysis) The temperature of cutting tool was measured to draw the TGA curve and compared with different cutting fluids on TGD (Derivative Thermo- Gravimetric Analysis). Also change of mass was studied when antioxidants were added to cutting fluid. Compared to other vegetable oils, coconut oil shows less thermal stability due to less fatty acid and less weight gain in anti-oxidative environment. Research lead to the use of eco-friendly coconut oil for better surface finish.

The percentage wise analysis of software implementation and identification of affective machining is carried out in ANOVA[3]. Performance of coconut oil was examined to have less surface roughness and flank wear. Performance investigated the effects of different parameters of cutting speed. Coconut oil is selected because of thermal and oxidative properties. ANOVA analysis also shows how changing the cutting parameters affects the performance of the cutting tool.The suspension of high heat carrying capacity materials in cutting fluid results in reduction of surface roughness.

The cutting fluids used while machining must be eco-friendly and user friendly as they may react with work or at high temperature they may produce gas leading to hazards and accidents [5].

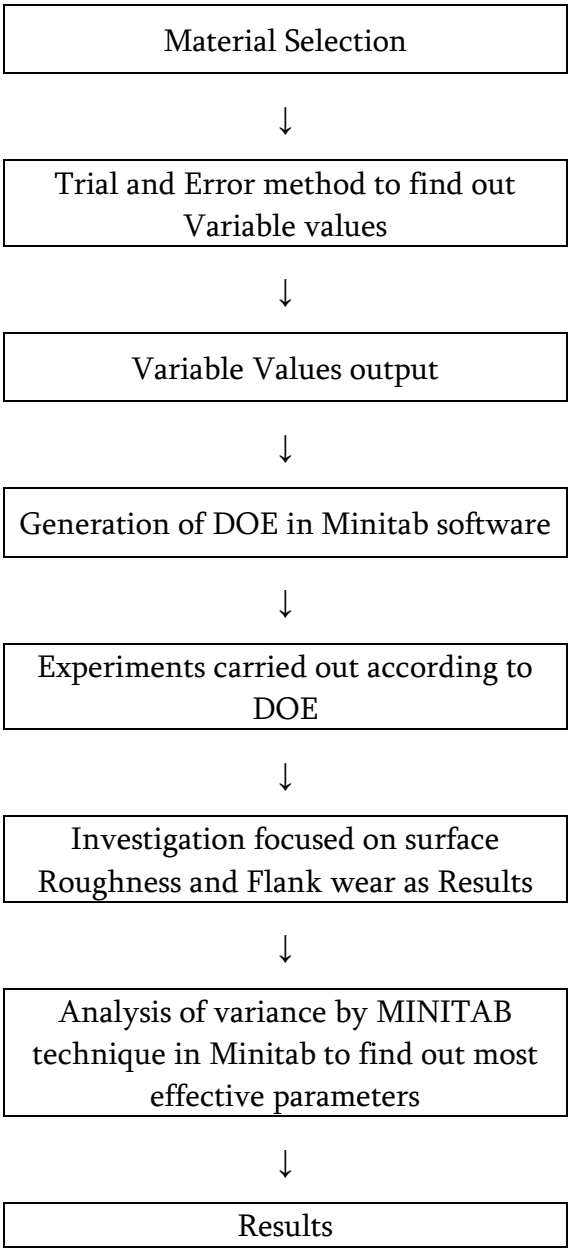
Nano cutting fluid is prepared for machining the AISI 1040 to identify its thermal conductivity, specific heat, and heat transfer co-efficient with variation in suspended nano boric acid percentage in different cutting oils. For considerable decrement in surface roughness and cutting temperature 0.5%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

The Nano boric acid in varying percentage is suspended in coconut oil and SAE 40 oil for its investigation[6] 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. Among the different variations taken in investigation, cutting fluid with 0.5% Nano boric acid suspension was found the best . It was 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 decreased surface roughness, flank wear, and tool temperature compared

to base oil and among all the investigations, 0.5% suspension of Nano boric acid performs best in SAE-40 and coconut oil during turning of AISI 1040 steel.

III. METHODOLOGY

1. Flow of Work



2. Material Selection

On the basis of literature review we found that material selected having properties. Typical use of material selected include appliances, restaurant equipment, cooking utensils, sinks, automotive trim, architectural applications such as windows and doors, railway cars, trailers and hose clamps. Coconut oil is user-friendly and eco-friendly our third aim satisfies by selecting *it.*

3. Trial and Error method to find out Variable values

Testing of material is done on conventional lathe machines, Raw material.. We have done trial and error method to find out variances that may fulfil our study and given the data of that. As the variables will take by us are depth of cut, feed rate and diameter.
Selected material bar of 25 mm and 20mm diameter will be take for turning process on conventional lathe machine. Whole setup will test the material under the different conditions. Experimental condition from varying different parameters on the basis of trial and error method firstly the work piece will test under different condition and got the final variables that can affect the machining. For finding out best most affecting parameters carry out.

4. Variable Values output

As per trial and error method we will receive set of data that can be varied for our project work. Further going into deep this data contains variable values of depth of cut, feed rate and diameter.

5. Generation of DOE in Minitab Software

Variable values obtain from trial and error method we have to define all design of experiments and they can be calculated by feeding values in Minitab Software. In Minitab factorial design of experiment is used for generating DOE and this will give values of the variances. Experimental work will be done the help of this tabular data.

6. Experiments carried out according to DOE

DOE values are taken for conducting experimental work. Material examines under this DOE on conventional lathe machine, turning carried out. Investigation carried with help of stainless steel tool.

7. Investigation focused on surface Roughness as Results

After experimental work tool will examine for surface roughness. Testing and tested part examination will carry out by company through surface tester.

8. Analysis of variance in MINITAB to find out most effective parameters

Our aim to find out most affecting parameters to turning process, we will do analysis of variance in Minitab Software. Method selected for this analysis is not decided examines effect of all variance on surface roughness.

IV. REFERENCES

1. Noordin M.Y., Venkatesh, V.C., Chan, C.L., Abdullah, A., Performance evaluation of cemented carbide tools in turning AISI 1010 steel, J. Mater. Process Technology.
2. Jayadas, N.H., Prabhakaran Nair K. (2006), Coconut oil as base oil for industrial lubricants—evaluation and modification of thermal, oxidative and low temperature properties, Tribology.
3. M Anthony Xavior, M. Adithan, (2009), determines the influence of cutting fluids on tool wear and surface roughness during turning of AISI 304 austenitic stainless steel, Journal of materials processing technology.
4. P Vamsi Krishna, D. Nageswara Rao (2008), Performance evaluation of solid lubricants in terms of machining parameters in turning, International Journal of Machine Tools and Manufacture.
5. Krishna Mohan Rao. G, Padmini. R, Vamsi Krishna. S (2008), Performance evaluation of eco-friendly nano fluids in machining. Recent Advances in Robotics, Aeronautical and Mechanical Engineering.
6. P Vamsi Krishna, R.R. Srikant, D. Nageswara Rao (2010), Experimental investigation on the performance.
7. KP. Sodavadia and A.H. Makwana(2014), Experimental Investigation on the Performance of Coconut oil Based Nano Fluid as Lubricants during Turning of AISI 304 Austenitic Stainless Steel, International Journal of Advanced MechanicalEngineering.