OPTIMIZATION OF MACHINING PARAMETERS AFFECTING SURFACE ROUGHNESS OF Al6082

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ABSTRACT

Every producing trade should reduce the producing value and increase the standard of a product. The aim of this project work is to optimize the chosen management factors therefore on reduce surface roughness in dry finish edge operation. throughout this project Taguchi methodology is employed to work out the optimum machining parameters an excellent deal of expeditiously. The cutting parameters unit of measure spindle speed, feed rate, and depth of cut. These parameters unit of measure investigated at 3 absolutely entirely completely different levels. On the premise of L27 orthogonal array of Taguchi methodology twenty-seven experiments were performed. The machining operation performed on a vertical machining centre whereas not pattern agent. This experimental knowledge was analyzed pattern Minitab writing to spot the foremost necessary issue. the fabric used throughout this project is Al6082 metal alloy.

Keyword: - *Surface Roughness, Taguchi, ANOVA, Minitab, End mill.*

1. INTRODUCTION

It is not possible to provide an utterly sleek surface by machining or an alternative method. It implies that by machining method some roughness is usually gifted on the surface, which may vary per changes the machining parameter. Surface roughness is an extremely necessary issue that has an effect on the surface quality of the merchandise. The surface roughness is that the finer irregularities (peaks and valleys) of the surface. Surface roughness could be a part of surface texture. It's described by the deviations within the direction of the conventional vector of a true surface. These deviations are depends on the surface quality. The surface is rough if these deviations are giant and the surface is sleek if these deviations are tiny.

2. LITERATURE REVIEW

The many analysisers have research on material Al6082, however only a few analysisers has research work on finish edge operation on Al6082. during this gift work we have a tendency to are hand-picked the fabric Al6082. the target of gift work is to optimize the cutting parameter of Al6082 in dry finish edge operation.

Shetty et al. [1] (2008) were conducted Associate in Nursing experiment and used Taguchi and Response Surface Methodologies for minimizing the surface roughness in turning of discontinuously strengthened atomic number 13 composites (DRACs) having atomic number 13 alloy 6061 because the matrix and containing fifteen vol.% of carbide particles of mean diameter twenty five lumen underneath pressured steam jet approach.

Muammer Nalbant et al. [2] (2009) were conducted an Associate in Nursing experiment and seen the results of machining on AISI 1030 steel uncoated, PVD- and CVD-coated cemented inorganic compound insert variation in feed rates, cutting speeds whereas keeping the depth of cuts constant. This method was avoided mistreatment cooling liquids. The result shows that a negative relationship between the common surface roughness and cutting speed for this tool. The surface roughness was decreased by increasing cutting speed.

Yallese et al. [3] (2010) were conducted the experiment for cutting forces in dry turning operation of AISI 52100 hot work-piece steel (50 HRC). They performed twenty-seven experiments and given effects of parameters like

cutting speed, feed rate and depth of cut. They found that the foremost vital issue moving the elements of the cutting forces was depth of cut.

Sahoo [4] (2011) was conducted an Associate in Nursing experimental study to research the results of cutting speed, feed rate, and depth of cut for minimum surface roughness for AISI 1040 steel once the fabric were machined on a CNC turning machine (lathe). Analysis of variance package was used to analyse the result for the purpose of optimizing the parameter

Yansong Guo et al.[5] (2012) were conducted an experiments and seen the effects of an approach which incorporates both energy consumption and surface roughness for optimizing the cutting parameters in finish turning. This was based on a surface roughness model, they were optimized the cutting parameters for surfacefinish with minimum energy consumption. The analysis were exhausted ballroom dance approach in deciding the best cutting parameters for finishing turning operations for minimum energy consumption, by specified a surface end.

Kamal Hassan et al.[6] (2012) were conducted AN experiment and seen the consequences of method parameters on Material Removal Rate (MRR) in turning operation of fabric C34000. The Cutting speed, feed rate and depth of cut were taken cutting parameters during this experiment and result were analysed multivariate analysis in MINITAB sixteen. The cutting speed and feed rate were most dominated issue for MRR. The conclusion shows that the MRR rate was increased by increasing the cutting speed and feed rate.

Upinder Kumar Yadav et al. [7] (2012) were conducted AN experiment and optimized machining parameters for surface roughness in CNC turning by Taguchi methodology. The result shows that the feed rate and cutting speed were the most dominant issue for minimum surface roughness and also the surface roughness was increased with increasing the feed rate & decreasing the cutting speed.

Ilhan Asiltürk et al. [8] (2012) were conducted AN experiment and optimized machining parameters for surface roughness in turning operation. Taguchi methodology was accustomed to found the best turning method parameters. The result was analysed by each Taguchi and RSM methodology and it shows that the feed rate was the foremost vital issue for surface roughness.

Najiha M.S. et al. [9] (2013) were conducted AN experiment to see the optimum cutting parameters for the top edge method of atomic number 13 alloy 6061T6 beneath wet cooling conditions. The response surface methodology was used for optimizing the surface roughness. The result shows that the feed rate and also the depth of cut was the foremost vital factors for surface roughness.

M Saravana Kumar et al. [10] (2014) were conducted AN experiment to see optimum small edge parameters of AL-6082 by victimisation DOE conception. The cutting speed, feed rate and depth of cur were
chosen the method parameter. The result shows that MRR was faded with decreasing the tool diameter, spindle speed and feed rate.

Nisha Tamta et al. [11] (2015) were conducted AN experiment for optimum drilling machining method for Surface roughness (Ra) victimisation Taguchi methodology on material atomic number 13 Alloy 6082. The result shows that the drilling depth was the foremost vital issue follow by feed rate for roughness Ra.

K. Shiva Kumar et al. [12] (2015) were conducted AN experiment for optimum cutting parameters in CNC finish edge of atomic number 13 Alloy 6082. RS methodology was chosen to optimize the surface roughness. The result shows that the depth of cut was the influencing parameter followed by Speed and feed for Ra.

Rishi dominion Singh et al. [13] (2016) were conducted AN experiment to see optimum parameter for minimum surface roughness in CNC finish edge. The response surface methodology was used for this experiment. The result shows that cutting speed to be the foremost vital and important machining parameter followed by feed rate. The surface roughness was increased by increasing the feed however faded by increasing the cutting speed and nose radius.

Anurag Salankar et al. [14] (2017) were conducted AN experiment on extruded brass-lead alloy and inconel625 fabricated from nickel and Cr thanks to their high strength, wear-resistance and fatigue resistance. The machining

was performed on the vertical edge centre victimisation HSS tool material. The result was compared by diagrammatically for various method parameters, performance parameters evaluated and closing optimizing method parameters.

S. Sakthivelu et al. [15] (2017) were conducted AN experiment on atomic number 13 Alloy 7075 T6 in CNC miller victimization High-Speed Steel (HSS) cutting implement for top quality of surface end and metal removal rate. The result shows that the depth of cut was the foremost influencing parameter for the material removal rate followed by feed and cutting speed.

3. EXPERIMENTAL DESIGN

Taguchi Method

The Taguchi Methods was developed by was Genichi Taguchi. He was a Japanese engineer who began working for the telecommunications company, Electrical Communications Lab, a part of NT&T, in 1950's. Taguchi method is used evaluating and implementing improvements in the products, optimization of the objectives function. Optimization means determination of best levels of control factors that maximize the signal- to – noise ratio.

Work piece Material

The material used in this research is Aluminium Alloy 6082. It is a medium strength alloy with highly corrosion resistant. The Aluminium alloy 6082 has highest strength of the 6000 series. It is mostly used in high stress application, trusses, bridges, cranes and transport application etc.

Table 1: Machining Parameter and Levels of Experiment

Factor	Level 1	Level 2	Level 3
Speed (N) (rpm)	800	1200	1600
Feed (f) (mm/min.)	100	150	200
Depth of Cut (d) (mm)	0.5	1.0	1.5

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