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Integrated Approach of Abrasive Jet Machining and Magneto Finishing

M. Tech. Scholar Vimal Kumar Saini, Assistant Prof. Sono Bhardawaj, Professor Amit Gupta
Department of Mechanical Engineering,
Geeta Engineering College,
Panipat, Haryana

Abstract- In this paper, we will discuss the effect of hybridization of abrasive jet machining and magneto finishing. New-fangled machining procedures may be categorized due to temperament of energy in work. AFM is somewhat newest procedure along with non-traditional machined Technique. Low substance elimination rate occurs to be one serious inadequacy of nearly the entire procedures. MAFM is an innovative expansion in AFM. By means of magnetically fielding in the region of the work portion in AFM, we can amplify the material removal rate in addition to the plate finishing. In the current effort Al-606were punctured & exhausted by customary machine operation capacity & surfacing finished up were made by methods for rough stream machining. Testing was grasped for information requirements like rough pondering, grating system degree and no of cycles. The yield counter is substance disposal pace.

Keywords- MAF, Machining, Al-606.

I. INTRODUCTION

Magneto abrasive flow machining (MAFM-machining with the help of magnetic abrasives) is a well-known technique in industry. A machining process called orbital flow machining is being claimed to be improvement over abrasive flow machining process which can operate complex components under three dimensional machining.

These processes are well known as HMP – which is a recently phenomenon in non-conventional machining advancement.

Hybrid machining process are developed for the reason to made usage of combination or mutuality enhanced merits & some of the adverse effects are reduced or avoided for individually applied constituent process produce. MRR is considered as a general problem in almost every nonconventional machining operations or processes like electric discharge machining, laser beam machining and electrochemical machining etc. and several attempts are underdevelopment to overcome these problems.

An ongoing development is being conducting via the main objective of exploring methods for MRR in abrasive flow machining and this paper reports the preliminary result of that ongoing project.

A recent technique is being studied which uses an intense fascinating magnetically fielding around a work piece. Fascinating magnetic fields were very finally utilized in the research done in past, as machined torque is being adopted for magnetic abrasive machining or finishing (MAF), used for fine machinate operation of devices, specifically tubes which are circular. In this report the process is explained which is under investigation and this process is the combination of Magneto Abrasive Finishing and Abrasive Flow Machining, and it is named as Magneto Abrasive Flow Machining (MAFM).

In 1960 there was a process developed to crinkle machining termed as AFM. Surface roughness and material removal rate both are being improved with this technique, it also possess well-structured and surgical venues and the industries using tool manufacturing techniques. Surface fine polish to complex intricate geometries. This process has been used widely in many industries like aerospace industries, defense sectors, finish characteristics are being controlled by some parameters of principal

machining such as pressure of extrusion, media, volume of flow, number of cycles, size of grit and configuration of work piece. AFF processes are recently trended to be joined with many other unconventional machining which is known as hybrid machining. This has created many new aspects for fine machining material which are difficult to get machined with complex intricate shapes and which seem to be impossible likewise.

These are the processes which are in tragic use in a large industrial and technological arena for precision engineering. These are also used in industries working in the field of micro scale engineering and nano scale engineering. This paper review justifies the lean fundamentals and research in the fine machining arena and develops a well known defined of this fine machining (finishing) technique, which has the aim of helped in the field of optimum machining variable for the finished off a kind of work piece material widely used in industry.

MAFM is a new but known un-conventional process of machining. Its surface finishes ranges from rough to spontaneously fine. Small and sharp cutting edges create fine chips on very fine sized (abrasive) particles. It uses fascinating magnetic field which envelops the work piece which plays an important role in the deflection of path of abrasive particles. Besides, little bundles simple to review, & blemishes can be promptly perceived.

The subsections that are procured dependably in small pack sizes with constant transports with at most quality & competence through very low estimations of stocked & scraped, lower examination costs for advancing toward parts, & early affirmation of flaws. Consequently, JIT based systems can improve the thing quality & profitability to essential estimation at any rate affiliations must handle its measures in way that meet their own stand-out authentic structure, plan & strategy. The following research paper is designed as follows. Section II describes the overall previous research work whereas Section III gives methodology . Result Analysis define in section IV and last but not the least Section V concludes the paper.

II. LITERATURE REVIEW

In this section, we will discuss basic introduction and high points of influence, explanations and issues in the research work by researchers in different field. Researchers have tried a lot in recent times to attain the max tensile strength.

Junye Li (2014) – As the thickness of grating grains is high and molecule measure is so lean; the grains prompts have an incredible consistency. The variety of interface of distributing circumstance, for example, expulsion of raised weight, causes the end result of coarse to nonlinear substance or material yet more noticeable on the essence of cylinder channels, in order to gain prevalent surface smoothness. Because of the grating's unremitting disposal impact on nonlinear cylinder channel faces, later than the rough stream machining, the face shape turns out to be moreover smooth and unrivaled than the good and bad times sooner than agreement.

Jose Cherian (2013) - The basic percent drop in surface unevenness be able to be expanded via maintaining up the expulsion weight, morsel work whole number and Abrasive pondering at hoisted levels, even as the standard power proportion have the capacity to be expanded by keeping up expulsion weight and coarse thought (fixation) at taking off dimension and piece work number at short dimension. Likewise at what time the power proportion is most elevated the part reduction in surface unevenness is additionally most elevated. The affiliation coefficient (connection) among normal percent decrease in surface unevenness and standard power proportion is lifted as contrast with relationship of normal rate reduction in surface unevenness with standard hub and outspread powers.

P.D. Kamble (2012) - An intriguing (attractive) field has been practical in the district of a part is to be handled by grating stream machining along with an improved pace of substance disposal has been accomplished. Intriguing field broadly influences commonly Substance Elimination Rate and surface unevenness. The inclination of the bend implies that Substance Elimination Rate or MRR ascends with captivating field additional than surfaces unevenness. Thus, more u degree in Substance Elimination Rate is plausible at still hoisted gauges of entrancing turf. In favor of a predefined measure of cycles, Here exist a perceptible redesigning in Substance Elimination Rate and shell unevenness. Littler quantities of series are fundamental for evacuating the comparative

quantity of substance from the element, whenever experienced in the interesting turf. Intriguing attractive turf and media flood pace intermix by means of one another.

The amalgamation of short flood paces and raised attractive transition fixation yields beneficial Substance Elimination Rate and less noteworthy surface unevenness. Media flood pace don't considerably affect Substance Elimination Rate and surface unevenness within the sight of an entrancing attractive field. Substance Elimination Rate and surface unevenness together dimension off ensuing to a distinct number of cycles.

Ramandeep Singh (2012) - Presented that issue is separated from the work-piece by letting the stream of a semi-strong viscos-versatile/plastic rough overloaded media completely through or past the activity face to be finished and done. This exploration work is a push to tentatively investigate the outcome of surprising vent/section thought for discharge of coarse burdened visco-versatile media on the presentation systems in rough stream manufacturing.

The result recommend that the job-piece faces have solo utter/entry for media drain comprise upper substance disposal and all the more redesigning in shell unevenness in relationship with job- piece faces have various utter/entries along with the presentation methodology reduce by means of enlargement in the quantity of event for media discharge.

R.S. Walia (2012) - planned the rough stream machining was exacerbated with the captivating attractive power for effective increase in stipulations of substance disposal (Material Removal). The interesting attractive power is created in the locale of the full range of the barrel shaped occupation by letting through direct charge to the solenoid, which builds up the entrancing attractive power in the direction of the coarse constituent part opposite to the hub of job.

M. Ravi Sankar (2011) - planned that rough surge manufacturing was mechanically created during 20th century the same as a system to deburr, buff up, and sweep muddled to get to the surfaces in the vein of convoluted geometries and breaking points by twisted a coarse burdened visco-versatile polymer in abundance of them. It utilizes two upstanding different water driven barrels, which expel media in reverse and forward completely through methods for access made by means of the job piece and utensil. Touch happens everywhere the standard get ahead of completely throughout the exceedingly controlling entry. The principle parts of AFM movement are the bit of gear, utensil and coarse media.

Ramandeep Singh (2010) - Abrasive stream machining (AFM) is a modestly new non-ordinary small scale machining strategy builded up as a procedure to debur, sweep, buff up and dispose of recast store of activities in an abundant collection of apparatuses. Material is standoffish from the work-piece by twisted a semi-strong visco-flexible manufactured coarse burdened media completely via or past the activity surface to be finished.

Device makeup of multifaceted channels involving surface/ zones unattainable to regular procedures could be finished and finished with highest distinction and exactness by this movement. The presented effort is a push to lead tentatively inspects the result of assorted vent/entry thought for discharge of coarse overloaded visco-flexible media on the presentation systems in rough stream machining.

III. METHODOLOGY

Despite the fact that the assignment is not that straightforward as it gives the impression to be, as it necessitate a no. of procedures, it could be doing into leaps for its flourishing accomplishment.

The entire research is fundamentally alienated into 3 divisions:

- Dating gathering via dissimilar groups for fundamental functions of the machining.
- Study on the data assembled
- Optimized the transformations to opt for the superlative amendment & superlative abrasive material for surface finishing.

The primary section of the venture requires some period to collect all imperative components. There are sure neighboring organizations which are utilizing this type of surface completing m/cs for their manifestations. The certainties interconnected to the requirements of AFM would be gathered via those companies. Just a few imperatives are

compulsory to be assumed as all the data can't be accomplished from the enterprises. So by settling on reasonable imperative we could seal in the cuts for the pace 1 to be accomplished.

The 2nd pace grasps exercise of an approx.. Strategy for surface estimation & correlation of the data aggregated. Just a few cases will be endorsed in spite of the fact that a no. of cycles at various conditions. Such cases will be the experiential under the e magnifying instrument for the evaluation. 3rd pace is to joint & analyzing that data on any of the examination programming to go for the most ideal strategy.

That would spotlight to join assorted procedures for an improved & cross breed surfacing completing strategy. That would likewise encourage us to infer the most brilliant open means for the AFM. Choice of decision a practical, with no inconvenience introduced and environmental wonderful media is additionally one of the main spotlights of this undertaking.

IV. PROCESS PARAMETERS

The chosen factors and their assortment in support of the comprehensive research as given away in the Table 1.

Table 1. Chosen Method Factors and Their assortment.

Sr. No.	Process factors	Range	Unit
1.	Abrasive atom dimension	140-240	Micron
2	No of successions	60-160	-
3	Job material	Al – 6061 alloy	-
4	Coarse Deliberation	45-55	Percentage

IV. RESULT ANALYSIS

The test outcomes are analyzed by means of Taguchi method. L9 orthogonal selection is chosen in favor of the method. The input factors are:

- Abrasive deliberation,
- Abrasive network extent
- No of cycle, and Production Retort Is MRR.

Table 2. Proportion Composition of Essentials in Job Piece Substance.

Constituent	Job piece (Al - 6061)
Cu	0.015
Mg	0.465
Si	0.522
Fe	0.545
Ni	0.0048
Mn	0.164
Zn	0.0180
Pb	0.0196
Sn	<.00150
Ti	0.0201
Cr	0.0076
Al	99.87

Table 3. L27 Orthogonal array, MRR after each experiment

	Factors	
Exp. No.	MRR 1 10^{-3}g/s	S/N ratio
1	2.45	7.7833
2	2.79	8.9121
3	2.98	9.4843
4	3.36	10.5268
5	3.52	10.9309
6	2.83	9.0357
7	3.85	11.7092
8	3.29	10.3439
9	3.39	10.6040

IV. CONCLUSION

In the current effort Al-606were punctured & exhausted by customary machine operation capacity & surfacing finished up were made by methods for rough stream machining. Testing was grasped for information requirements like rough pondering, grating system degree and no of cycles.

The yield counter is substance disposal pace. Based on results the twisting up is:

- Finishing of confused to achieve surface can be made by methods for rough stream machining.

- Because of Taguchi system, it is experiential that grating fixation is essential viewpoint for MRR. Substance disposal pace intensifies with lift in grating focus.
- As the no of cycle raises, the substance disposal pace additionally rise.
- Substance disposal pace decays with lift in grating lattice estimate.

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