A Review on Optimization of Process Parameter in Electrical Discharge Machining Process

Ayush Shukla[1*], Amitesh Paul[2]

[1]PG Scholar, 2Assistant Professor, Department of Mechanical Engineering

[2]Sri Satya Sai College of Engineering Gandhinagar, Bhopal (M.P.), INDIA.

*Corresponding Author Mail id: ayush.shukla1601@gmail.com

Abstract—This paper represents the various review on Electric Discharge Machining (EDM). The invention of new materials need a development of new machining process regarding high hardness of material and make an effective machining process. So EDM is mainly used for those materials which are very difficult to machine with conventional machining process. In today's competitive environment, the companies all around the world are trying to increase their profits without increasing the sales price of their products. This can only be done through minimizing the losses that are occurring during production. The reduction in production time, step up profits an Optimization of process. Parameters have a very major role for enhancement of productivity. Therefore, a work for the optimization of parameters can solve the above problems. In last decade, the researcher has found different way to improve the parameters of EDM process. So, these reviews work the different effective research in field of EDM process to find optimum parameters for machining process with suitable technique.

Keywords —*Electrical Discharge Machining, Process Parameters, Optimization, Response Surface Methodology.*

I. INTRODUCTION

Information about final paper submission is available from the conference website.Electrical discharge Machining (EDM) is a controlled metal-removal procedure that is used to uproot metal toward method for electric sparkle disintegration. In this transform a electric sparkle may be utilized Likewise those cutting apparatus with cut (erode) those workpiece to prepare the completed a piece of the fancied state.

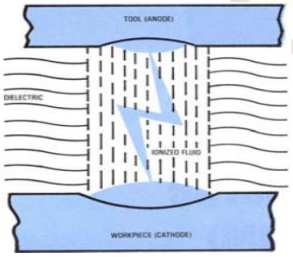

Fig. 1Principle of Electric discharge machine

The metal-removal procedure is performed by applying a pulsating (ON/OFF) electrical charge for High-recurrence current through those cathodes of the workpiece. This removes (erodes) thick, as minor ends for metal starting with the workpiece during a controlled rate.

II. LITERATURE REVIEW

Then afterward Audit from claiming Numerous examination papers require will planned in this Section associated towards electrical release Machining.

Reddy et al. [2] (2010), contemplated that impact by outline four variables for example, current, servo control, obligation cycle Furthermore open circuit voltage over the outputs on MRR, TWR, sr Furthermore hardness on the kick the bucket sinker EDM about machining AISI 304 ss. They needed been utilized doe procedure for blended level outline and examine to performing a base amount for runs. They attained that to higher MRR, the current, servo and obligation cycle if make settled Similarly as large amounts Also 95% certainty level with plunging request in the event of TWR with same Components.

Rahman et al. [3] (2011) tentatively discovered out those machining trademark about austenitic stainless steel 304 through electric release machining. Those examination demonstrates that with expanding present expands the MRR and surface unpleasantness. Those TWR builds with top present until 150 µ sec pulse on time. Also, from those outcomes they were discovered to copper cathode al long pulse on time no device wear with opposite polarity.

Dewangan [4] (2010) investigated those impact of machining parameter settings like pulse on time, release current Also breadth about device from claiming AISI P20 apparatus-and-kick the bucket work material utilizing u-molded copper cathode with inner part flushing strategy. Trials were led with the L18 orthogonal exhibit In view of those Taguchi strategy.

Moreover, the sign-to-clamor proportions connected with those watched qualities in the trials were resolved by which figure is practically influenced by the reactions for material evacuation rate (MRR), overcut (OC) and apparatus Wear rate (TWR).

Tomadi et al. [5] (2009) investigated that impact from claiming machining settings for tungsten carbide on the outputs for example, TWR, MRR and surface complete. Affirmation test performed on assess slip the middle of predicted values and Eventually Tom's perusing test runs as far as machining aspects. They were discovered crazy copper tungsten apparatus utilize for preferred surface completing of the worth of effort bit. They were utilizing full factorial doe to streamlining Furthermore discovered out for more stupendous pulse off time lesseps device around wear about tungsten carbide Also for current, voltage and pulse on time augment device wear expanded.

Iqbal and khan [6] (2011) optimized those machining methodology parameters for those EDM processing operation of a stainless-steel worth of effort bit for copper devices. Information parameters need aid rpm for tool, bolster rate and voltage same time those outputs would MRR, TWR Furthermore Ra. Focal composite outline is used to streamlining to get higher MRR, TWR and Ra. Starting with the effects the machining settings for ideal condition would carried toward 1200 RPM, voltage 120V and bolster rate 4μm/Sec.

Abbas et al. [7] (2007), reviewed the patterns of Different examination once EDM for example, ultra-nationalistic vibration helped EDM, dry EDM, powder blended EDM, water built EDM Also Different demonstrating systems about EDM on exact Also faultlessly EDM execution. They discovered that ultra-nationalistic vibration helped EDM will be suiting to micro machining, dry EDM is cosset effective, water built EDM gives safe and conductive attempting environment, powder blended EDM gives expanding surface quality, MRR and TWR.

Singh et al [8] (2004), investigated those impact of machining settings for example, top current ahead MRR, overcut, TWR Also Ra Previously, EDM from claiming E31 apparatus-and-kick the bucket work heat treated with separate instruments for example, copper, brass, aluminum Furthermore copper tungsten. Starting with effects copper and aluminum cathode provides for higher MRR, overcut for breadth is base for this device.

Kumar et al [9] (2009), reviewed on the new employments for electrical release machining (EDM) process, for specific unmistakable quality on the prospective about this procedure for surface change. Over and Past evacuation about fill in material Throughout machining, the key nature of the methodology brings about disintegration from claiming device material also. Production of the plasma entry holding about material vapors starting with that disintegrating worth of effort material Also apparatus electrode; And pyrolysis of the dielectric influences the surface piece following machining Also hence, its properties. Planned material exchange might make conveyed out under particular machining states by utilizing whichever composite electrodes or Eventually Tom's perusing A split metallic powders in the dielectric alternately both. In this survey on the wonder for surface adjustment Toward electric release machining and approaching leanings for its requisitions.

Bhattacharyya et al. [10] (2007), tried different things looking into EDM utilizing those improvements of a scientific model in light of RSM to correlating the intuitive Furthermore higher request impact looking into machining parameter for example, top current Furthermore pulse on time about surface integument of m2 bite the dust steel machined through Investigation from claiming EDM parameters around surface roughness, white layer thickness Furthermore surface split thickness. With the former model those ideal mix assessed for minimizing those surface integuments.

Dhar et al [11] (2007), created A second request nonlinear scientific model will build the association between machining settings. And anova need been performed will confirm those fit Furthermore sufficiency of the model. Transform parameters once EDM are current, pulse on time Furthermore hole voltage through the reactions about MRR, TWR Furthermore roc of a composite material with metal device around Hosting 30 mm barrel shaped breadth.

III.CONCLUSION

In this study, the influence of significant EDM process parameters like peak current, pulse on time and pulse off time on response parameters like MRR, TWR, and SR while machining the steel has been concluded for research work. It is concluded to conducted according to the response surface methods in future.
Analysis of variance (ANOVA) used for to study the significance on performance. Literature reveals findings

on Electro Discharge Machining of various materials. Most of the work is reported to study the parameters like Peak current, Pulse on time, pulse off time and voltage to find out Surface roughness, Material removal rate (MRR) and Tool wear ratio (TWR) using different types of tools and with the help of design of experiments and statistical optimization techniques.

REFERENCES

[1] G. Taguchi, "Introduction to Quality Engineering, Asian Productivity organization", Tokyo, 1990.

[2] Reddy Sidda B., Rao PS, Kumar JS and Reddy KVK, Parametric study of electric discharge machining of AISI 304 stainless steel, International journal of engineering science and technology, 2(8) (2010): pp. 3535-3550.

[3] Rahman M.M., Khan M.A.R., Kadirgama K., Noor M.M. and Bakar R.A., Experimental Investigation into Electrical Discharge Machining of Stainless Steel 304, Journal of Applied Sciences, 11(3) (2011): pp. 549-554.

[4] Dewangan S.K., Experimental Investigation of Machining parameters for EDM using U-shaped Electrode of AISI P20 tool steel, M-Tech Thesis (2010), http://ethesis.nitrkl.ac.in/2071/1/Thesis_EDM.pdf

[5] Tomadi S.H., Hassan M.A. and Hamedon Z., Analysis of the influence of EDM parameters on surface quality, material removal rate and electrode wear of tungsten carbide, Proceedings of the International Multi Conference of Engineers and Computer Scientists, Vol II (2009).

[6] Iqbal AKM A. and Khan A.A., Optimization of process parameters on EDM milling of stainless steel AISI 304, Advanced Materials Research, 264-265 (2011): pp. 979-984.

[7] Abbas Md. N., Solomon D.G. and Bahari Md. F., A review on current research trends in electrical discharge machining (EDM), International Journal of Machine Tool and Manufacture, 47 (2007): pp. 1214-1228.

[8] Singh S., Maheshwari S. and Pandey P., Some investigations into the electric discharge machining of hardened tool steel using different electrode materials, Journal of Materials Processing Technology, 149 (2004): pp. 272-277. 42

[9] Kumar S., Singh R., Singh T. P. and Sethi B.L., Surface modification by electrical discharge machining: A review, Journal of Materials Processing Technology, 209(8) (2009): pp. 3675-3687.

[10] Bhattacharyya B., Gangopadhyay S. and Sarkar B.R., Modelling and Analysis of EDMed job surface integrity, Journal of Materials Processing Technology, 189 (2007): 169-177.

[11] Dhar S., Purohit R., Saini N., Sharma A. and Kumar G.H., Mathematical modelling of electric discharge machining of cast Al-4Cu-6Si alloy-10 wt.% SiCp composites, Journal of Materials Processing Technology, pp. 24-29, 2007.