STM JOURNALS

Trends in Machine Design
ISSN: 2455-3352 (Online)
Volume 4, Issue 3
www.stmjournals.com

A Review on "Optimization of Process Parameters for Honing Process of GG25 Cylinder Liner"

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Abstract

Manufacturing processes play requisite role in the market and industries. Stipulation of manufacturing processes has increased now days. Optimization is very essential thing in manufacturing processes. Due to optimization accuracy, productivity can be increased. Honing is a super finishing manufacturing process. Honing provides proficient surface finishing of the cylinder liner. Main purpose of honing is to give prevention against the leakage of oil. So, it can be stated that honing is used for the purpose of oil retention in cylinder liner. Hence utilization of oil is decreased. By optimization of honing process by optimization technique, parameters will be optimized and production rate of GG25 cylinder liner will be increased.

Keywords: *Honing machine, methodology, design of experiment*

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INTRODUCTION

Manufacturing processes are the essential in industry. Manufacturing processes work on quality of product and cost effectiveness, so it can be stated that quality of product and cost effectiveness can be enhanced. Manufacturing processes clear the use of convenient products. Materials can be transformed in to essential products in manufacturing processes, so it can be stated that importance of manufacturing processes in industry is highly demanded.

Cylinder liner is the essential component in automobile industry. Cylinder liner is manufactured by centrifugal process. Cylinder liner reduces the utilization of lubricant. Cylinder liner and honing are connected with each other. Honing is used in cylinder liner for the purpose of cylindrical surfaces' finishing and retention of oil. Optimization is an essential part in industry. Without optimization, precision and accuracy cannot be obtained. Optimization of honing process gives better productivity and cost reduction can be got.

Honing is one of the most importance manufacturing processes. So, many operations are done in product, and after that, last operation is done and that operation is honing, so, it can be stated that honing is the last manufacturing process. Honing provides proficient finishing so honing is known as super finishing process.

Utilization of oil can be decreased in honing process. Honing process provides exact shape and size of product. Honing is used in better finishing of the product. Honing is used in retention of oil, means to give prevention against the leakage of oil.

There are mainly two types of honing machines:

1. Horizontal honing machine, and
2. Vertical honing machine.

Here, vertical honing machine is used for finishing components. In this machine, workpiece is in statutory condition and reciprocation of tool is very good. In this, vertical honing machine is semi auto honing machine, hence it can be stated that semi auto honing machine gives perfect dimensional accuracy and optimization of parameters can be achieved (Figure 1).

LITERATURE REVIEWS

Buj-Corral *et al.* describes usage of the advance industrial honing machine, and by using this machine, better production can be obtained. Only few forming tests are tested by advance industrial honing machine. Parameters of

surface roughness are measured accurately and mathematical model is done. At the end of the experiments, new parameter DifRa is achieved [2].

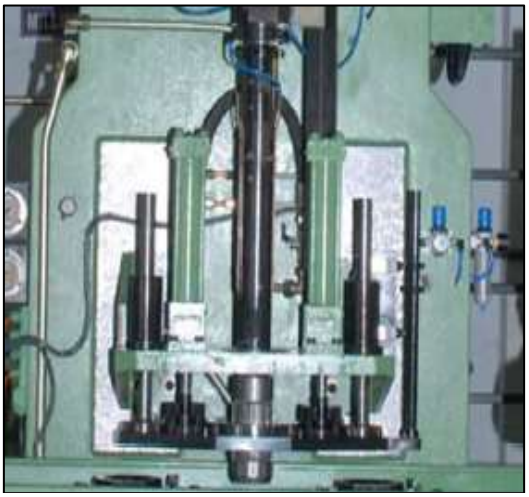

Fig. 1: *Honing Machine [1].*

Zahouani *et al.* describes appropriate finishing for many different types of honing processes; by using morphological technology, best finishing can be got and various shapes and sizes are clearly got accurately.

Strength and retention of oil are efficiently done in required form. By using multi-fractal system, linearity of scratches is done, then after doing it, exact form of product and geometrical shapes are mentioned [3].

Schmitt *et al.* researched about the honing process which affects the bored surface, essential parameters of bore have been optimized due to honing process; so, due to this reason, last stage finishing can be got accurately. Then by using main components of honing, higher quality and accuracy is achieved, so we can state that honing improves geometric shapes of product. Some intricate and difficult processes are removed by using mathematical modelling [4].

Silva *et al.* gives an essential thing of gears in now days; process of grinding finishes profile of gear but exact finishing is not achieved hence honing is used; but in this paper, optimization of honing process was enhanced by using a particle swarm optimization technique; then parameters are optimized perfectly like spindle speed, feed rate, oscillation time, spark out time etc. Then simulation is done with respect to practical measurements. Feed rate is achieved with exact values in all directions [5].

Buj-Corral *et al.* researched various parameters like surface roughness and material removal rate and what effect is possible on these parameters is achieved. Parameters of surface roughness Ra and Rt are optimized with the help of regression model. Then for the purpose to improve productivity, roughness is considered as much possible to the lower thing. Conditions of honing can be improved with the help of multipurpose optimization method [6].

Goeldel *et al.* researched about complexity of honing process; the simulation model which helps in simulation of complete real honing cycles at macroscopic level and also validated them with industrial experimental result for deformation of tool during the honing process. Forecasting of product can be got by simulation model [7].

Sabri *et al.* researched about the background of honing of industrial area and cylinder liners, with the help of background of industry of honing, best suitable production can be got [8]. Then, the honing process uses different grit size of honing tool and concluding that the large and medium grit size resulted in high and medium fineness of surface which are independent on less than 60 μm size [8].

Buj-Corral *et al.* described honing process using three different standards of roughness and are verified using mathematical model which showed variability of roughness using different parameters. And then, some values are optimized [9].

Pawlus *et al.* used cylinder surface topographies to develop correlation and regression model between parameters which fall in Rk group and Rq group as their standard for surface roughness and their effect on honed surfaces and probability of plateau honing pressure is less [10].

Guo *et al.* described about optimized parameters for honed surface wheel, the relation between honing wheel and parameter affecting the work pieces and concluded

different radial structure as per requirement of product, which is to be manufactured under honing process, and productivity is increased [11].

METHODOLOGY

It is main thing to indentify and to solve the problem. Tool is the main part of any machine, without proper tool, machine cannot work properly; life of tool will be increased with help of optimization; by doing optimization of parameters, exact values of parameters can be got.

So, many techniques are available for optimization like algorithm, modelling etc. And practical measurements and experiments will be carried out by design of experiments.

Design of experiments is the heart of optimization; without design of experiments, exactness cannot be got. There are mainly three types of design of experiments methods; and one of the best suitable methods will be used.

CONCLUSION

Parameters of honing process will be optimized in cylinder liner. With the help of design of experiments and regression model, parameters of honing process will be optimized and better tool life will be achieved. Doing this thing, productivity will be increased and cost will be reduced; and by reducing cost, better production will be got; and then parameters will be optimized and optimum result will be got.

REFERENCES

1. www.esteemauto.com
2. Irene Buj-Corral, Lourdes Rodero-De-Lamo, Lluis Macro-Almagro. Use of Results from Honing Test Machines to Determine Roughness in Industrial Honing Machines. Elsevier, *J Manuf Process*. 2017; 60–69p.
3. Zahouani H, Mansori MEL. Multi-Scale and Multi-Fractal Analysis of Abrasive Wear Signature of Honing Process. Elsevier, *Wear*. 2017; 178–177p.
4. Christina Schmitt, Dirk Bahre. Analysis of the Process Dynamics for the Precision Honing of Bores. Elsevier, *Procedia CIRP*. 2014; 17: 692–697p.
5. Sandro Pereira da Silva, Sergio Luiz Moni Ribeiro Filho, Lincoln Cardoso Brandao. Particle Swarm Optimization for Achieving the Minimum Profile Error in Honing Process. Elsevier, *Precis Eng*. 2014; 38: 759–768p.
6. Irene Buj-Corral, Joan Vivancos-Calvet, Milton Coba-Salcedo. Modelling of Surface Finish and Material Removal Rate in Rough Honing. Elsevier, *Precis Eng*. 2014; 38: 100–108p.
7. Benoit Goeldel, Mohmed EL Mansori, Didier Dumur. Macroscopic Simulation of the Liner Honing Process. Elsevier, *CIRP-Manuf Technol*. 2012; 61: 319–322p.
8. Sabri L, Mezghani S, Mansori MEL, *et al.* Multi Study of Finish-Honing Process in Mass Production of Cylinder Liner. Elsevier, *Wear*. 2011; 271: 509–513p.
9. Irene Buj-Corral, Joan Vivancos-Calvet. Roughness Variability in the Honing Process of Steel Cylinders with CBN Metal Bonded Tools. Elsevier, *Precis Eng*. 2011; 289–293p.
10. Pawlus P, Cieslak T, Mathia T. The Study of Cylinder Liner Plateau Honing Process. Elsevier, *J Mater Process Technol*. 2009; 209: 6078–6086p.
11. Guo YB, Zhang Y, Zhong JA, *et al.* Optimization of Honing Wheel Structure Parameters in Ultra-Precision Plane Honing. Elsevier, *J Mater Process Technol.* 2002; 129: 96–100p.

Cite this Article
Joshi Vatsal K, Hardik Chauhan N, Sadatiya Akash R. A Review on "Optimization of Process Parameters for Honing Process of GG25 Cylinder Liner". *Trends in Machine Design*. 2017; 4(3): 5–7p.

