

Straight Pass Rate Improvement of Productivity in Honing Process

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ABSTRACT: Honing is an abrasive machining process that produce a precision surface on a metal work piece by a scrubbing an abrasive stone against it along a controlled path. Honing is primarily used to improve the geometric form of a surface, but may also improve the surface texture. Typical application are the finishing cylinders for the internal combustion engines, spindle and gears. There are many type of hones but all consist of one or more abrasive stone that are held under pressure against the surface they are working on. In terms of sharpening knives, a honing steel does not actually hone knives but simply realigns the metal along the edge. other similar process lapping and super finishing. Honing is an internal cutting technique that uses abrasives on a rotating tool to produce extremely accurate holes that require a very smooth finish. By increase the sticks on honing tool the number of stroke reduce on the abrasive spindle and also he cycle-time reduce and improve productivity of normal operation. The overall production efficiency increase and reduce the lead time of the process.

I. INTRODUCTION

Honing is a low velocity abrading process in which stock is removed from metallic or non-metallic surfaces by bonded abrasive sticks. It is a finishing operation employed not only to produce high finishing but also to correct out-off roundness, taper and axial distortion in work piece. In honing, since a simultaneous rotating and reciprocating motion is given to the stick, the surface produced will have a characteristic cross-hatch lay pattern.

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Fig 1.1 HONING PROCESS

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Depending on size and shape of work pieces honing can be performed by following two methods.

Typical applications are the finishing of Cylinder for internal combustion engines, yokes for steering column, air bearing spindles and gears. Finish boring or internal grinding may do the job, but spindle deflection, variation in hardness of the material.

Machining a hole to within less than 0.001 in. in diameter and maintaining true roundness and straightness with finishes less than 20(μ) in. is one of the more difficult jobs in manufacturing. It can remove as little as 0.0001 in. of stock or as much as 0.125 in. of stock. However, usually only 0.002 into 0.020 in stock is left on the diameter for honing.

II. HONING TOOL

“Honing is a finishing process performed by a honing tool, which contains a set of three to a dozen and more bonded abrasive sticks”. The sticks are equally spaced about the periphery of the honing tool. They are held against the work surface with controlled light pressure, usually exercised by small springs.

“The honing tool is given a complex rotational and oscillatory axial motion, which combine to produce a cross-hatched lay pattern of very low surface roughness Stone Spindle”



Fig 1.2 HONING TOOL

A honing head comprises a holder having a plurality of radial guide slots angularly spaced from each other and an axial hole, a rough-finishing cone shaft and a finishing cone shaft or a single cone shaft axially slid ably received in the hole, and a plurality of rough-finishing and finishing honing stone supports alternately disposed in the guide slots for radial movement there in.

III. TYPE OF HONING MACHINE

1. Vertical honing machine
2. Horizontal honing machine

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IV. WORKING

The honing process used to obtain precise dimension and surfaces in cylindrical shapes with a width range of diameter the applies to part such as hydraulic cylinder, piston, bearing bores, pin holes, and to same external cylindrical surfaces.

The honing process offers advantages of low capital equipment cost, high metal removal, and extreme accuracy of 0.001mm ($\pm 0.00004'$) in a width verity of materials



Fig 4.1 HONING MACHINE

The abrasive action of the honing tool remove material from the work piece inside diameter. The tool rotates and expands while the work piece reciprocates back and forth. to achieves such close tolerances, the work piece must be allowed to “float” or move in the three axes. The movement is the single most important point in achieving’s the closer tolerance required in industry today. This, course, reduce one of the three axes of movement, thus reducing the amount of moment or “float”.



Fig 4.2 HONING HOLDER

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Thus machines hold the work as well as the tool in vertical position. they are available in single and multiple spindle type. The spindle head and hence, tools reciprocates and not the working piece. suitable fixtures are employed to hold the work piece in position.

Most of the Morten machines carry a hydraulic drive for the spindle heads and the tools. thus machine is best for shorter jobs.in appetences', thus machines re-assemble the drilling machine. In honing work, the vertical machine is widely used the horizontal ones. A honing tools heads used on it.

In vertical honing machine the Renault component is fixed between the bar and the jaw, the fixable spindle is placed at the top the bar. the spindle moves in a longitudinal direction due to spindle motion the internal surface are machined. it's gives high surface finish to components.



Fig 4.3 LINER MOTION

V. PROBLEM STATEMENT

- 1.Improve productivity
- 2.good surface finish, linearity, corrective size.

VI. TYPE OF HONING STICK

We are using Sunnen's latest development in honing oil technology is SHO-500, a new renewable/sustainable honing oil that is clean, green and 100% vegetable -based. Sunnen's premier line of honing oils will produce the lowest overall honing cost per part. your

DIAMOND HONING TOOLS

We are using the diamond tool in honing process. And change the holder face four into eight.so high pressure applied to remove the metal stripes. That changing process will be improving productivity.

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Sunna diamond plates honing tools are available for precision bore finishing in industrial application using sunned Nagel, Belden, accucut and other type of honing-production honing equipment.

The plate sleeves, mandrels and pilots of sunned single stock honing tools are designed for maximum accuracy and fast cycle time



Fig 6 DIAMOND TOOL

VII. HONING OILS AND COOLANTS

There are many type of oil used in honing process. but before using oil names in M-40 honing oil, SHO-985 honing oil, MAN-863 honing oil, LP8X honing oil, MB-30 honing oil, MAN-852 honing oil, KG3X honing oil, CK-50 honing oil, MAN-C honing oil concentrate, SCC-100/101 honing coolant.

- Diamond honing tool
- Corrosion resistant tools
- CBN honing stick
- Industrial multi-edge stick
- Flex stone honing sticks
- Sylph's treated aluminum
- Oxide stone

investment in top-quality sunnen honing oils. Saturated with surface active agents, provides the extreme lubricity that allows you to use higher honing pressure and harder abrasives for faster, more profitable cutting rates.

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- Petroleum-free, ideal for general use.
- Ideal for honing application where additives cannot be used, such as nuclear and some aerospace parts, or where company policies discourage use of fluid with such additives.
- Does not contain material derived from animals.

SPECIFICATION FOR AL COMPONENT (ASHOK LEYLAND)

AISI 1020 STEEL

COMPONENT TOLERANCE:

ELEMENT	CONTENT
Carbon, C	0.17-0.230%
Iron, Fe	99.08-99.53%
Manganese, Mn	0.30-0.60%
Phosphorous, P	≤ 0.040%
Sulfur, S	≤0.050%

Total length = 334mm (tolerance + or -0.2) Slip diameter =54mm (tolerance + or -0.1) Blaring diameter =52mm (tolerance + or -0.1) Tube outer diameter =45mm (tolerance + or -0.1) Raw material outer diameter =39.90mm
Fish diameter = 40mm (tolerance + or -0.06)

Locust inner diameter =48mm (tolerance + or -0.1) Groove diameter = 50mm (tolerance + or -0.1)

Normal operating cycle time:

Honing Procedure for Roughing: Honing sticks width = 10mm Thickness = 6mm
Length = 100mm

Using Stick Grid D107

Initial diameter = 39.95mm

Final diameter= 40.03mm

Metal removal= (initial diameter-final diameter)
= (39.95-40.03) Metal removal=0.08mm

Metal removal per stroke= (Metal removal/no. of strokes)
= (0.08/112) Metal removal per stroke =0.0007mm Cycle time = 03.00mins

Surface Value = 1.8RA

2. Changed operating cycle time: Using Stick grid D151

Machining size =39.90mm

Honing size =40.03mm

Metal removal= (initial diameter-final diameter)
= (39.95-40.03) Metal removal=0.08mm

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Metal removal per stroke= (Metal removal/no. of strokes)
= (0.08/80) Metal removal per stroke =0.001mm Honing cycle time =02.00mins
Surface Values =2.2RA

VIII. APPLICATION

Engine: cylinder bore, cylinder liner, crank bore, connecting rod, diesel fuel injection components, crank shaft pulley, rocker arm, turbo charger valve, roller lifter, VVT components.

Transmission and chassis: pinion gear, differential gear, ABS control valve, steering housing, break-drum, break cylinder, break-value and stator. Honing surface have excellent Tibetological properties high bearing area ratio, low surface roughness and define cross hatch patter for lubrication retention. Tight bore size and centricity control couple with enhanced Tibetological characteristics extended the life of bearing.

Nagel has successfully installed thousands of honing systems all across the globe in the automotive, aerospace, hydraulic and laws & garden, oil & natural gas, appliance, medical and other industries.

The improved design structure helps to reduce the cycle time up 30% of the full process cycle. This charging methodology in a tool design help in leading stage to increase the performance of the honing process. Finally, through the tool design production efficiency is partially improved and cycle time cycle time is reduced.

Hydraulics: axial flow pumps, rotary oil pumps, gear pumps, radial piston housing and valves.

IX. CONCLUSION

In a day of arriving technologies, the exposure of industrial based technical mechanisms is also growing up by providing the way to implement the new designs in the machine and tools to enrich the standard. In the way, stroke length is reduced in the honing machine by implementing additional sticks to the working tool instead of using only four sticks.

While machining the internal surface using honing machine the tool is designed containing eight stick in the tool diameter. Considering the design to reduce time, cost and to increase the quality a new design is made for the honing tool containing six diamond edged tools in which it performs the task by improved design structure.

REFERENCES

1. Jake Moffett (2014) "Collaboration Life Cycle"
2. Qianfan Xin "Friction and Lubrication in Diesel Engine System Design"
3. A.G. Bruzzone, H.L. Coasta, P.M. Lonardo, D.A. Lucca "Advanced in Engineered Surface for Functional Performance" (2008)
4. Seemabanu, M. Rajesh, G.S. Prakash "Improving First Pass Yield and Reducing Defect Cost of Honing Machine Using Six Sigma Approach"
5. M.H. Pimpalgaonkar, chugeraneshlaxmanrao, adesanthoshlaxnanrao "A review of Optimization Process Parameter on Honing Machine"
6. A.J. Cox, 1969, "Modern Honing Practice" machinery publication, wilt hire, first edition.
7. Kohut T. (1989) "Surface Finishing with Abrasive Flow Machining SME Technical" paper, 35-43.
8. Boothroyd, G. and Knight, W.A. (1989) "Fundamentals of Machining and Machine Tool" 2nd edition. Marcel Dekker, New York.
9. Schibish, Dirk Fried Rich, Uwe (2002). "Superfinishing Technology" Germany: Yerlag Modern Industries.
10. "Hardness Effects on Abrasive Flow Machining" (2013). Omer Eyercioglu., mehmed veysel cakir.