

Fabrication of Portable Head for Lathe

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Abstract— A “Portable Head” is attached on conventional lathe machine as to eliminate the need, for an operator owning on a milling machine, slotting machine, shaper machine, drilling machine. It is design to mount on carriage vertically on lathe machine and to be used without disturbing setup in associated In this project work an attempt has been taken so that the operations like keyways, grooves, slotting, tapping, off-set counter boring and off-set counter sinking etc. can be easily performed on conventional lathe. The lathe–milling keyway attachment consist of vertical column, lead screw, handle, drill chuck, pulley etc. The pulley is driven by the motor which is mounted at back side of column with the help of belt drive. The moment of tool can be adjusted by adjusting carriage.

Keywords— Portable head, The lathe–milling keyway, Milling machine, Drilling machine, Casting

I. INTRODUCTION

A single lathe can perform operations like facing turning, centre drilling, taper etc. But it cannot perform operations like offset drilling or slotting these operations cannot be performed on lathe either it perform together. It is simple and flexible device use as individual machine PORTABLE HEAD is able to operate offset drilling, grinding, boring, slotting, milling and operations which cannot perform by lathe. Portable head is special attachment to lathe either it perform together. It is simple and flexible device use as individual machine. The milling-drilling and slotting attachment is commonly referred to use on a Versa Mill. It is a portable unit capable of doing many operations that normally requires a single purpose machines. This is a self-powered, vertical feed, variable-speed precision tool which may be mounted in any position in place of tool post. With a two-directional feed table, the PORTABLE HEAD becomes a complete machining tool for bench or in place machining of parts too large to be moved or held in conventional machine tools.

II. LITERATURE SURVEY AND REVIEW

During the study of our project “FABRICATION OF PORTABLE HEAD FOR LATHE” We visited different workshops and collect more data about the project .We studied in detail working principle required for running of project & studied material required from book. We also took references from papers as given below:

A Review on Advance Automation of Conventional Lathe Machine

Now a day, products can be produced by modern technology, which uses computer software, hardware and firm ware in industries. It is needed to use CNC lathe machine to get more accurate dimensions and irregular shape. So, CNC machines are becoming more and more important in modernized industrialization. Developing and changing into semi-automatic control lathe machine, there are three required portions, namely, mechanical electronics and hydraulic. In this project we convert the convention lathes which have 5ft bed length in to the semi-automatic lathe. In mechanical side we replace the ball screw in place of lead screw for better accuracy and remove some unnecessary component like gears for providing space for motors. We add an extra plates or structure for installation of motors. Also provides a hydraulic circuit for coolant. In electronic side we used a servo/ stepper motor for both Z and X axis and provide controller for the efficient operation.

B Design and performance evaluation of a horizontal hydraulic honing attachment to lathe

The surface finish between two mating parts in an assembly has significant influence on the mechanical properties such as wear resistance, corrosion resistance, fatigue resistance and stress concentration. Honing is a finishing process, in which a tool called hone carries out a combined rotary and reciprocating motion while the work piece is stationary. Average roughness up to 0.1µm can be attained. Most honing is done on internal cylindrical surface, such as automobile cylindrical walls. . The best surface roughness obtainable on this machine is 0.3 µm.

C Investigation on Automation of Lathe Machine

Now days, products can be produced by modern technology, which uses computer software, hardware and firm ware in industries. It is needed to use CNC lathe machine to get more accurate dimensions and irregular shape. So, CNC machines are becoming more and more important in modernized industrialization. There are many conventional lathe machines in our country. To build a new modern developed country, it is required to convert these conventional lathe machines into semi-

automatic control lathe machine by retrofitting. Developing and changing into semi-automatic control lathe machine, there are three required portions, namely, mechanical electronics and hydraulic. In this project we convert the convention lathes which have 5ft bed length in to the semi-automatic lathe. In mechanical side we replace the ball screw in place of lead screw for better accuracy and remove some unnecessary component like gears for providing space for motors. We add an extra plates or structure for installation of motors. Also provides a hydraulic circuit for coolant. In electronic side we used a servo/ stepper motor for both Z and X axis and provide controller for the efficient operation.

III. COMPONENTS WITH DIMENSIONS

1) Column: - It is made from steel and is circular in cross section.

Height = 570 mm

Diameter = 85mm

2) Pulley: - Two pulleys made from steel.

Diameter of larger pulley (D1) = 160 mm

Diameter of smaller pulley (D2) = 100 mm

3) Lead Screw: - It is made from steel.

Length of lead screw = 520 mm

1 inch = 4 threads

Pitch = 4 mm

4) Shaft: - It is made from mild steel.

Length of shaft = 300 mm

Diameter of shaft = 20 mm

5) Total weight of machine components = 55 kg (including the weight of motor)

IV. FABRICATION PROCESS

1) Pattern making :-

Pattern Making is the first step casting process. Pattern is an important tool in the casting process. A pattern is the model of the part to be cast. It is considered as the replica of the part to be cast, except for the various allowances. It is slightly larger than the desired casting. The process of making a pattern is known as pattern making. Even one article is to be cast, pattern is essential. It is used to prepare the mould cavity. A pattern may contain core prints runners, gates and risers may form the part of pattern. Pattern making tool generally consist of carpenter tools and some special tools. These sets of tools are explained below-

- Contraction scale: It is used to measure pattern dimensions inclusive of shrinkage allowances. It is a metallic scale available in 300 or 500 mm length.
- Combination set: It is widely tool for pattern making. It can measure angles, perpendicularity, as well as for marking center on the cylindrical jobs.
 - Calipers: These are external or internal type calipers measures inside and outside diameters of pattern.
 - Ratchet brace: It is a tool that can be used to drill holes in horizontal and vertical plane.
 - Wheel brace: It is used for producing small holes only. It can drill small holes accurately and quickly.
 - Back and saw planes: they are used for cutting and parting operations respectively.

2) Moulding:-

Mould is defined as a cavity in which molten metal is poured and allowed it to cool so as to produce desired product. Such cavity may be formed with the help of a pattern. The process of making a mould is known as moulding. pattern is having its shape and size approximately similar to that of the desired shape of the component. Moulding is the process of making a mould. Moulds are normally made from heat resisting materials like sand and clay. Sand is widely used mould material for casting ferrous and non ferrous metals. According to their use moulding sands are classified

3) Casting:-

Casting process may be defined as the process of producing metal or alloy components of desired shape by pouring it into mould followed by necessary cooling to solidify. The solidified piece of metal or alloy is known as casting. It is clear from the definition of the process that a successful casting process consists of following steps.

4) Basic Steps in Casting Process:-

- Pattern making out of wood, metal or plastic.
- Mould making called the moulding from sand mixtures.
- Melting of metal or alloy.

- Pouring of molten metal into mould.
- Cooling and solidification of mould.
- Removing the solidified component from the mould.
- Cleaning and finishing of casting.
- Testing and Finishing of casting.



Fig. 1 Base

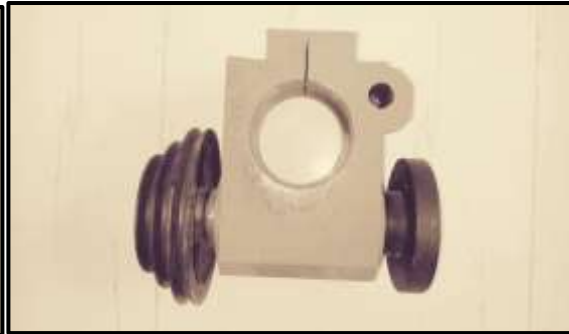


Fig.2 Body



Fig. 3 Column Head

V. ASSEMBLY

Whole components like column, screw and body are assembled in a proper sequence and the motor is attached outside to the plate of body. The carriage and tool post should be removed for the attachment of "Portable head" on the lathe machine. Screw the whole assembly on the place of carriage. While attaching the Portable Head in the place of carriage, the alignment test is required to perform so that, the centre of tool chuck can matched with the center of chuck of the lathe machine.

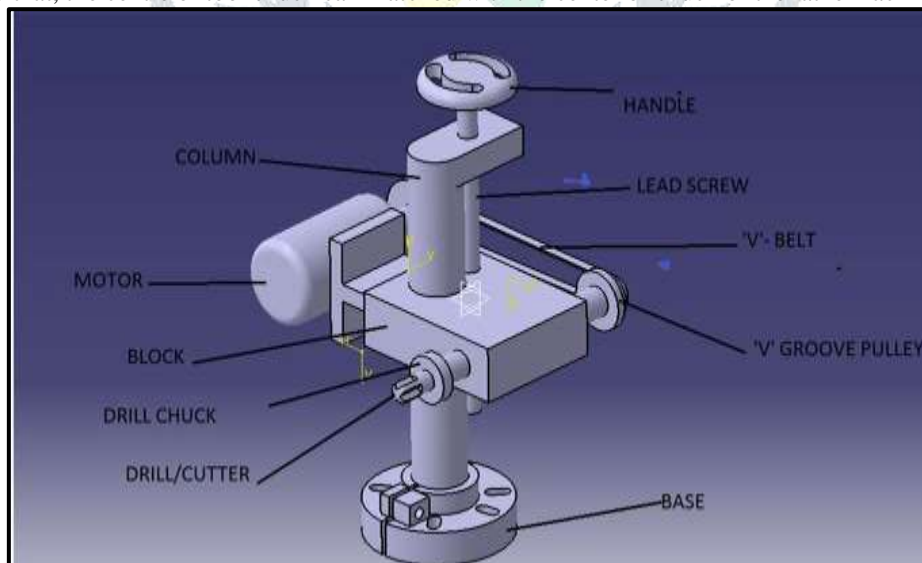


Fig. 4 CAD Model of Assembly of Portable Head



Fig. 5 Assembly of Portable Head

VI. WORKING

It consists of a tool which rotates continuously while performing job. The rotational movement to the tool is given by external supply of motor. The job is held in the chuck of the lathe machine and the chuck is locked with help of locking gear arrangement which is provided in the lathe machine. Different types of tool can be fixed in tool chuck and the tool can perform the operations like drilling, milling, grinding, key way and slotting. While performing operations, three directions can be given to the tool:-

- Vertical upward and downward direction with the help of lead screw of the “Portable Head”.
- Using cross direction of lathe machine.

The separate power supply for motor is given externally, for giving rotational movement to tool. Thus the motor is started and the job is fixed in chuck of lathe machine and required operations are performed

VII.

APPLICATIONS

- It can be used at site where machining resources are not available.
- It is useful and economical for job production in workshop.
- It can be used to produce holes in peripheri of the job.

TABLE I
COST OF COMPONENT

SR NO.	NAME OF COMPONENT	QUANTITY	COST (IN RS)
1.	Vertical Column	1	4000
2.	Base & Body	1	5000
3.	Lead Screw	1	2000

4.	Handle	1	1000
5.	Pulley & Belt	1	2000
6.	Shaft	1	1000
7.	Other	1	4000
		TOTAL	19000

VIII.

FUTURE SCOPE

The main objective behind making of this project was to produce a cheap, easily operated system which can be easily fabricated by readily available material and thus we proposed a simplistic design that can deliver efficient, productive and reliable mechanism which can be used in industries.

- It is useful and economical for job production in workshop.
- It can be used where machining resources are not available.
- It can be used in job production industries.

IX. CONCLUSION

- Number of operations can be performed on lathe machine by using portable head.
- It eliminates the use of various purpose machines.
- It can be used at sites where machining resources are not available.
- It is useful and economical in job production in workshops.
- It is a machine which is simple to operate, requires less maintenance cost.

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