

PORTABLE WOOD LATHE MACHINE

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ABSTRACT- In this project we have tried and build a well-functioning and efficient lathe machine. On this machine we will perform sanding, cutting and turning operations. In this project we have used locally available material and tools form the college workshop and used other machines tools of the college workshop. The cost of the goods personal and overhead determined the total cost of prototype of the Lathe Machine. Initially, the machine incorporates a wooden frame, with a headstock fixed in place, the tailstock moving close to the machine bed, a DC motor of RPM 780 for the rotation and the tool is always mounted on a slide in a non-removable cross-bed. The maximum length of workpiece that can be operated on is 30 cm. This mini lathe machine can reduce large producing costs, reducing labor costs. The machine is easy to carry because of its portability and assembly and could be easily maintained. Due to its compactness and small size it will consume less energy than conventional lathes and

will be easier and more efficient in small purpose work.

Keywords - Portable, cost-efficient, Energy saving

INTRODUCTION

Lathe is one of the most widely used machine tools in the world. It is known as the mother of all other machine tools. The main function of the lathe is to extract more than half of the material to give it the required shape and size. The work is stored securely and firmly in the chuck or between the centers of the lathe machine and turn it into a cutting tool that removes residual material in the form of discarded chips. Some of the most common functions that can be performed on a lathe machine are Facing, turning, drilling, knurling etc.

The manufactured lathe is 800 mm * 150mm * 250mm dimension port and is made of plywood, usually used to make pieces of wood . So here we are learning how to make a portable lathe machine. Our machine contains a DC motor used to drive a lathe chuck. The lathe

consists of a plywood bed with flexible layout, and is fitted with a ball bearing that allows for free rotation and work support from the other side. It also contains the grip handle you want and this grip can slide over the bed in line with the rotation axis of the work. We use a chuck attached to the motor shaft to rotate the work. The machine is designed to hold a piece of work and move the tool to the slider, to perform the tasks you want. The outer surface of the machine is designed to hold a piece of work firmly with a tool in place to achieve the tasks you want easily. We therefore successfully learn to design and perform a variety of possible tasks.

1.2 OBJECTIVE

- To reduce the initial and manufacturing cost.
- To make it portable for easy handling.
- For machining smaller objects like wood.
- To make it more energy efficient

2.LITERATURE REVIEW

Umakant Mahajan et al.[1] ‘They had done various operations on mini lathe and found that it can perform machining for more number of job in same time in which a carpenter do manually, its fabrication is easy and material required in fabrication is available easily so everyone can made it by himself for their use. Machining on mini lathe was studied and found that it energy efficient and also reduce human effort.’

Amisha Kolhatkar et al. [2] ‘In this project a study has been done on mini lathe machine to know about its portability, reliability and cost reduction. A basic design of mini lathe machine has been made and analysis has been done of the tool to determine the cause of failure of the tool. The fabricated model of the design was portable, cost efficient and can be assembled and dismantle according to the use.’

H.Niranjan Kumar et al. [3] ‘In this project it is about the Portable Wooden Lathe machine. They have found in a machining operation, vibration is frequent problem, which affects the machining performance and in

particular, the surface finish and tool life. Severe vibration occurs in the machining environment due to the motion between the cutting tool and the work piece. In all the cutting operations like turning, boring and milling, vibrations are induced due to the deformation of the work piece, machine structure and cutting tool. Also a new approach is taken in which the system utilizes O as method to minimize the experimental work needed and to give a good evaluation of the designed monitoring system.

Hui-Chin Chang et al. [4] ‘The paper integrates virtual reality technology with the application of 3D solid model to complete a virtual operation platform based on the transmitting principles of lathe machine during practical operation. At the same time, the paper has completed the virtual machining for various lathe works. Users are able to learn in the simulated environment without scruple, increasing the effects of training. After the accumulation of learning experience, it can be applied by users in the actual environment to accomplish the mission of operation.’

Andrew A. Eramah et al. [5] ‘A process capability study is performed for the turning process on a general purpose center lathe in order to verify the process performance and machine ability to perform within specified tolerance limit. The result of analysis of the data collected indicates that, the process is not capable of consistently bringing out shafts with diameter falling well within the customer’s expectation, even though it remained in statistical control. Also, the process is not acceptable. The process owner cannot claim that the customer will not experience difficulty in the use of products which translate into losses. The reliability of such product resulting from the process cannot therefore be guaranteed. The turning operation process capability indices is evaluated towards measuring the performance of the process.’

3. METHODOLOGY AND FABRICATION

3.1 METHODOLOGY

The device run with the assistance of motor which provides rotation to figure piece . Motor is found at headstock and is main unit of portable lathe machine. Work piece is connected between a hard and fast head stock and movable tailstock, tool must be supported on tool post , because it is manual kind of lathe machine somebody has to hold the tool on tool post . By running the motor various operations are often performed on portable lathe machine. Operations like turning, taper turning, chamfering, parting, cutting, knurling, finishing etc.

Design of portable lathe machine
Selection of parts to be used
Manufacturing and assembly of parts
Running the machine and performing operations
Conclusion

Fig. 3.1 Methodology Block Diagram

4. DIAGRAM



5. COMPONENTS OF LATHE MACHINE AND THEIR USES

The Construction of mini lathe is very easy and economical. In construction of portable lathe machine wooden material(such as plywood and wood blocks), bearing, nut and bolt,screws,DC motor, self-designed chuck, fevicol etc are used. Here we use the motor to avoid belt drive mechanism and also produce high torque. The major parts of portable lathe machine are

- Bed
- Head stock
- Tail stock
- Chuck
- Motor

BED

The portable lathe machine bed is made from plywood (800 X 250) mm where every part of the lathe is installed. One solid plywood to support other functional parts of the machine. On the left side of the bed, the head stock is located and the tail stock is located on the right side.

HEAD STOCK

The main function of the headstock is to transmit rotating power to the various functions of the lathe. Contains bearings used by the lathe to rotate the working piece against the tool bit.

TAIL STOCK

The tailstock slides along the bed rails and incorporates (usually) a non-rotating twist focused on the lathe spindle. The tailstock is usually supported at the top of long work pieces, or it will be fitted with a drill chuck to pierce and other holes. Tail stock is easily set or adjusted for alignment or misalignment by referring to the spinning center and carrying a center called spatial relation to support a single end of the function. A conflict of interest with a dead institution because it is important to carry heavy responsibilities.

CHUCK

Chuck is on time for all essential devices for capturing and rotating work on the lathe. It is basically attached to the spindle of the lathe headstock, the inner strands inside the chuck enter the outer strands of the spinning nose. Shorts, cylinders, blanks or those with

unusual shapes, which can be easily attached between places, are easily and firmly held in excess chuck. Works of short length and wide width or irregular shape, which can be easily connected between centers, are held quickly and firmly in the very chuck.

Motor

Motor is help to move the chuck with the help of the pulley, and it is 220v motor which are generating electricity with AC current.

House power is - 24watt, speed - 3000RPM

6. OPERATIONS

- Turning
- Sanding
- Cutting

7. CONCLUSION

In this project work has been done on portable lathe machine to know about its portability, working, cost reduction and energy saving. A basic design of the portable lathe machine has been made and analysis has been done of the machine to determine the working and failures. The assembled model of the design is portable, cost efficient and can be assembled and dismantled according to the need which will increase the mobility of the machine and can be easily carried.

This will be beneficial

for the workers and people who are not able to purchase the conventional costly lathe machine for their small scale works can perform their machining operation effectively. The portable lathe machine can reduce the initial cost of machining, reducing the labour cost and energy cost. Maintenance of this lathe is so easy that even it can be carried out within few minutes. Its small size let us work so easily and effectively that even we can learn to work and operate the lathe within a day. Its simple design and small compact size is the most attracting and also the cost and energy saving features are the most innovative and helping for the workers with low capitals.

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