

## 4 In 1 Lathe Machine

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**Abstract** - The 4 in 1 mini lathe machine is a multifunctional machine for meeting different need mini size for portable and easy operation. The base of machine is made of durable mild steel and plywood. The machine can transform into four different functional including drill press, mini lathe, thickness sander, disc sander. Various machining process are carried out by separate machining devices. Some compromises were made to allow the lathe to be so very light.

The drill press machine can carried out different places easily. By using drill press machine we can perform four operations which are

- i. 1-Drill Press
- ii. 2-Mini Lathe
- iii. 3-Thickness Sander
- iv. 4-Disc Sander

### Keywords:

This project is various machining process are carried out by one separate machining device. The machine can carried out different places easily. Operations like Drill Press, Mini Lathe, Thickness Sander, Disc Sander etc. by using drill press machine.

- i. Combining several tools in one.
- ii. Saves time
- iii. Space
- iv. Effort, and expense
- v. Some compromises were made to allow the lathe to be so very light

### Introduction

#### Lathe Machine:

**Working Principle:** The lathe is a machine tool which holds the workpiece between two rigid and strong supports called centers or in a chuck or face plate which revolves. The cutting tool is rigidly held and supported in a tool post which is fed against the revolving work. The normal cutting operations are performed with the cutting tool fed either parallel or at right angles to the axis of the work.

**1. Bed:** The bed is a heavy, rugged casting in which are mounted the working parts of the lathe. It carries the headstock and tail stock for supporting the workpiece and provides a base for the movement of carriage assembly which carries the tool.

**2. Legs:** The legs carry the entire load of machine and are firmly secured to floor by foundation bolts.

**3. Headstock:** The headstock is clamped on the left hand side of the bed and it serves as housing for the driving pulleys, back gears, headstock spindle, live centre and the feed reverse gear. The headstock spindle is a hollow cylindrical shaft that provides a drive from the motor to work holding devices.

**4. Gear Box:** The quick-change gear-box is placed below the headstock and contains a number of different sized gears.

**5. Carriage:** The carriage is located between the headstock and tailstock and serves the purpose of supporting, guiding and feeding the tool against the job during operation. The main parts of carriage are:

a) **The saddle** is an H-shaped casting mounted on the top of lathe ways. It provides support to cross-slide, compound rest and tool post.

**b). The cross slide** is mounted on the top of saddle, and it provides a mounted or automatic cross movement for the cutting tool.

**c). The compound rest** is fitted on the top of cross slide and is used to support the tool post and the cutting tool.

**d). The tool post** is mounted on the compound rest, and it rigidly clamps the cutting tool or tool holder at the proper height relative to the work centre line.

**e). The apron** is fastened to the saddle and it houses the gears, clutches and levers required to move the carriage or cross slide. The engagement of split nut lever and the automatic feed lever at the same time is prevented she carriage along the lathe bed.

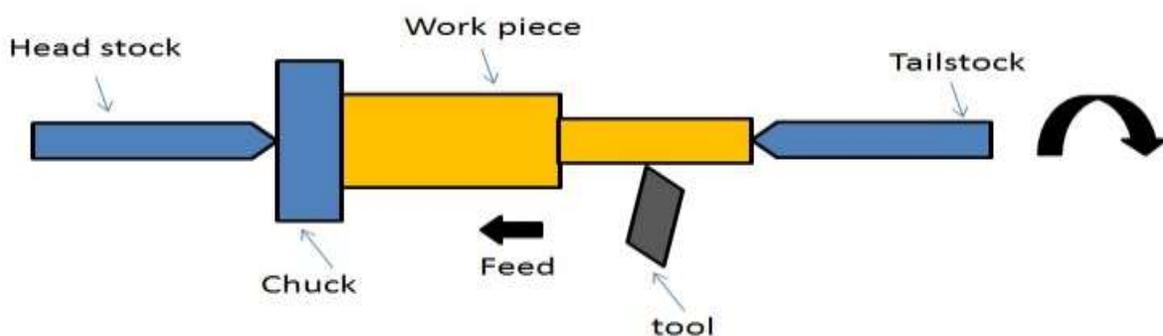
**6. Tailstock:** The tailstock is a movable casting located opposite the headstock on the ways of the bed. The tailstock can slide along the bed to accommodate different lengths of workpiece between the centers. A tailstock clamp is provided to lock the tailstock at any desired position. The tailstock spindle has an internal taper to hold the dead centre and the tapered shank tools such as reamers and drills.

### Lathe Operations:

The engine lathe is an accurate and versatile machine on which many operations can be performed. These operations are:

1. Plain Turning and Step Turning
2. Facing
3. Parting
4. Drilling
5. Reaming
6. Boring
7. Knurling
8. Grooving
9. Threading
10. Forming
11. Chamfering
12. Filing and Polishing
13. Taper Turning

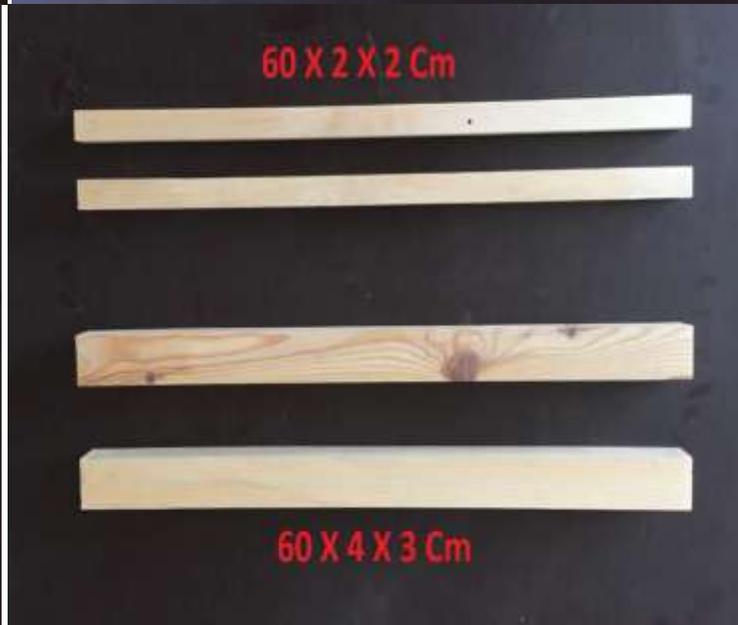
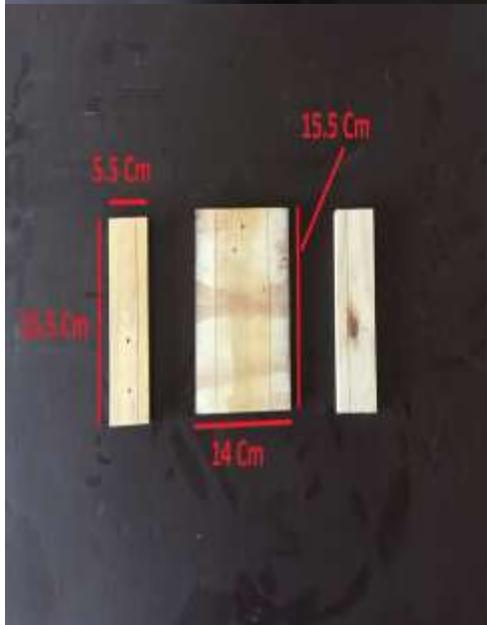
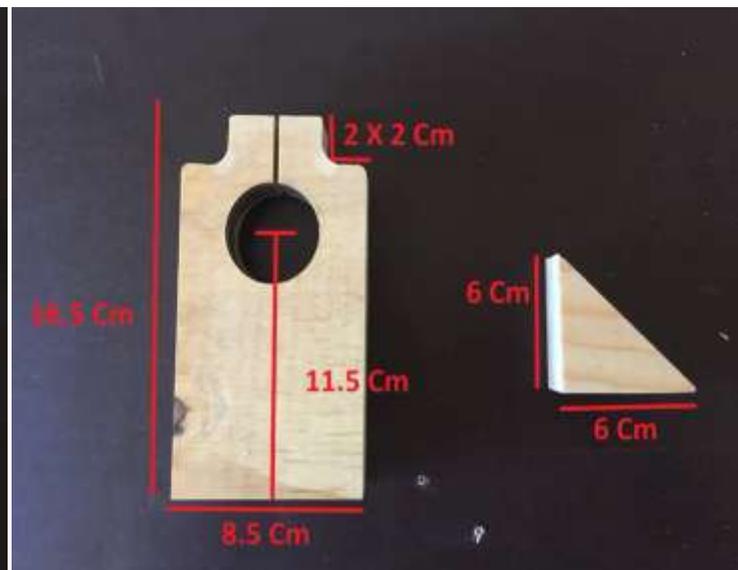
### Working Principle of Lathe Machine



The function of lathe is to remove metal from a piece of work to give it a desired shape and size. In a lathe machine, the work piece is rotate against the tool. The tool is used to remove material from the work piece. The direction of motion of tool is called feed.

### USES:

**1. Drilling Press:** They can perform operations other than drilling, such as countersinking, counter boring, reaming, and tapping large or small holes. A drilling machine, called a drill press, is used to cut holes into or through metal, wood, or other materials.



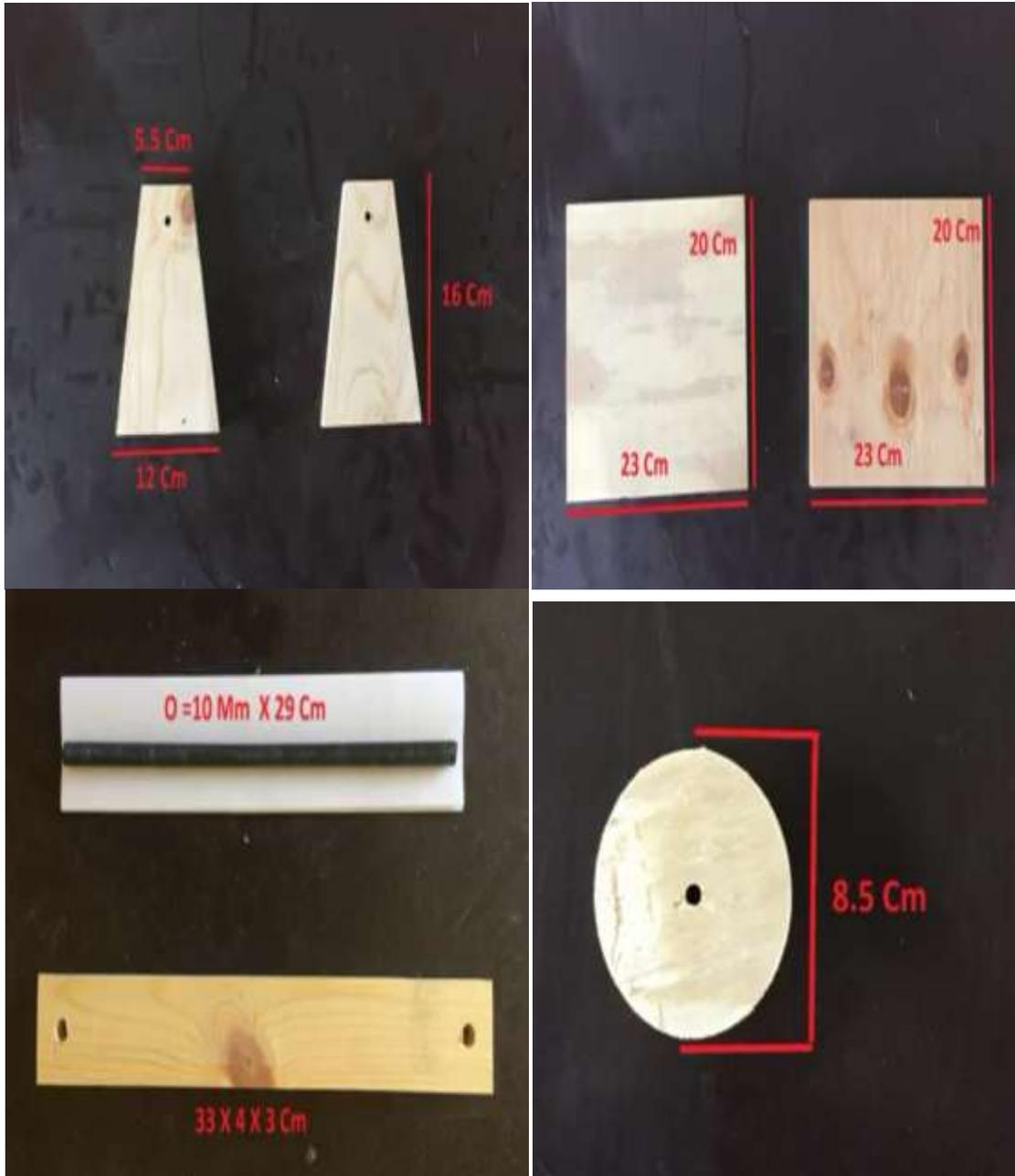
## 2. Mini Lathe:

A lathe is a machine that rotates the work piece about an axis of rotation to perform various operations such as cutting, sanding, knurling, drilling, deformation, facing, and turning, with tools that are applied to the work piece to create an object with symmetry about that axis.



## 3. Thickness Sander

Drum sander a cylindrical wheel with abrasive (as sandpaper) mounted on its outer curved surface and used for sanding flat surfaces of decorative stones.



#### 4.Disc Sander

Disk sander a machine having one or more flat circular disks faced with abrasive for smoothing wood surfaces (as floors).



### **Material Use:**

- a) Wood
- b) Hand Drill press
- c) Mild steel
- d) Threaded rod
- e) Coil Spring
- f) Washer
- g) Nut Bolt
- h) Screw
- i) Fevicol
- j) Drawer

### **Results and discussion**

The overall outcome of all lathe machines is perfect. But there are a lot of factors. Milling or turning woods generally needs no lubrication. Depends on what you are machining, how heavy your cuts are, and if you allow the work piece to cool down occasionally. If possible, avoid this. Some materials must be machined dry or at least using fluids other than standard coolant. Shorter tool life, more dust, things heat up, possibly. You can do woods without any lube, but if you go faster and faster it will help. Spray or flood coolant is not necessary and is likely overkill when you are doing small jobs, but it really helps to put some cutting oil on the work, or regular oil, these can be applied with a brush or squirt bottle. There are sticks of wax that can help you outcome - look for "Tap-Ease", for example. One more trick - spray methanol right on like coolant during metal cutting; this keeps it cool, provides a little lubrication, and dries clean. Just some suggestions to try.

### **Conclusion:**

Overall result of this 4 in 1 lathe machine is satisfactory and all work doing very well without any obstruction and problem.

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