

Subject Name - Basic Mechanical Engineering

Subject code - MEE105B

Name - Shreerang Mhatre

Division - 11

Roll no - 111056

Batch - K3

Experiment No - 3

* Name of the experiment → Determination of various operations of lathe machine.

* Aim → To study the various operations such as turning, step turning, facing, boring, taper turning, knurling, grooving, threading of centre lathe.

* Objective → To understand the various parts of lathe machine and its operations.

Summary

A product is made up of many components which are manufactured by various manufacturing processes such as casting, forging, welding, machining etc. depends on the application and cost of that particular component. In the machining process various operations come like turning, step turning, facing, boring, taper turning, knurling, grooving, threading. All these operations can be done on center lathe.

* Lathe machine -

Lathe is a machine tool which rotates the work piece on its axis to perform various operations such as cutting, sanding, knurling, drilling or deformation with tools that are applied to the work piece to create an object which has symmetry about an axis of rotation.

Examples - candle stick holders, gun barrels, sticks, stable legs, bowls, baseball bats etc.

* Components of a Lathe machine and their function -

- Bed - Almost all lathes have a horizontal beam is called as bed. It has guide ways on it for sliding and supporting tail stock and carriage.
- Head Stock - At one end of the bed is a head-stock. It contains drive mechanism with necessary speed change arrangement to achieve different speeds. It also has chuck which is used to hold the job.
- Tail stock - It is placed opposite to head stock. It can move along guide ways. Its main applications are to hold long jobs to avoid vibrations and excessive deformation and for drilling axial holes in the work piece it can also hold the tools such as drill, reamer, tap to do the operations like drilling, reaming etc.
- Carriage - It is located between headstock and tailstock. It can be moved in a longitudinal direction and can be fixed at any position.



• Carriage has following parts -

- a) Saddle - Its base portion, located across the lathe bed and carries cross slide and tool post, it can be moved longitudinally along the bed.
- b) Apron - It is attached to the saddle and appears as hanging on the front side. It consists of gears for motion transmission.
- c) Cross Slide - It is mounted on top of the saddle and acts as support to compound rest.
- d) Compound Rest - It is mounted on top of the saddle on a cross slide and it consists of swivel and top slide. The tool post is mounted on the top slide.
- e) Tool-post - It is used to hold the tool position the tool as per the requirement.

* Lathe Operations -

- ① Turning - This is the basic operation of lathe machines to produce cylindrical surfaces. The tool is fed parallel to the rotating work axis to create cylindrical surfaces.

- ② Facing - The tool is fed radially into the rotating work on one end to create a flat surface.
- ③ Taper turning - Instead of feeding the tool parallel to the axis of rotation, of the work, the tool is fed at an angle, thus creating a tapered cylinder or conical shape.
- ④ Contour turning (Profiling) - Instead of feeding the tool along a straight line parallel to the axis of rotation as in turning, the tool follows a contour that is other than straight.
- ⑤ Form turning (Forming) - The tool has a shape that is imparted to the work by plunging the tool radially into the work.
- ⑥ Chamfering - The cutting edge of the tool is used to cut an angle on the corner of the cylinder, forming what is called a chamfer.
- ⑦ Cutoff - The tool is fed radially into the rotating work at some location along its length to cut off the end of the part. This operation is sometimes referred to as parting.

- ⑧ Threading - A pointed tool is fed linearly across the outside surface of the rotating work part in a direction parallel to the axis of rotation at a large effective feed rate, thus creating threads in the cylinder.
- ⑨ Boring - A single-point tool is fed linearly, parallel to the axis of rotation, on the inside diameter of an existing hole in the part.
- ⑩ Drilling - Drilling can be performed on a lathe by feeding the drill into the rotating work along its axis. Reaming can be performed in a similar way.
- ⑪ Knurling - This is not a machining operation because it does not involve cutting of material. Instead, it is a metal forming operation used to produce a regular crosshatched pattern in the work surface.

Questions

Q1) List out the various types of lathe. Give one line description of each.

Ans → The various types of lathe are -

① Speed Lathe -

Used primarily for woodturning, metal spinning and polishing, a speed lathe is a high-speed spindle used to make everything from bowls and baseball bats to furniture parts. Speed lathes are simpler than other lathes and consist of a headstock, tailstock.

② Engine Lathe -

Engine lathes are ideal for manufacturers operating with a range of metals.

③ Turret Lathes -

Turret lathes are a great, efficient solution for mass-producing parts.

④ Tool Room Lathe -

The tool room lathe is used where extreme precision is needed. They have varied speed options spanning from incredibly low speed to very high speed.

Q2) How is the size of a lathe specified?
Explain with sketch.

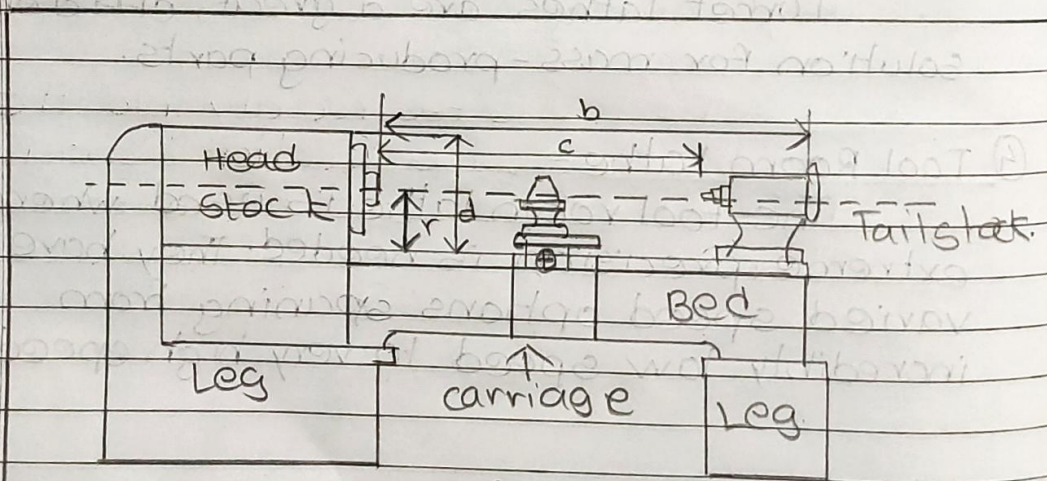
Ans → ① The height of the centers measured from the lathe bed.

② The swing diameter over bed. This is the largest diameter of work that will revolve without touching the bed and is twice the height of the centre measured from the bed of the lathe.

③ The length between centers. This is the maximum length of work that can be mounted between the lathe centers.

④ The swing diameter over carriage. This is the largest diameter of work that over bed.

⑤ The maximum bar diameter. This is the maximum diameter of bar stock that will pass through hole of the headstock spindle.



Specification of a Lathe.

Q3) what are different components mounted on the carriage of a lathe? Explain each component with.

Ans → The different components mounted on the carriage of a lathe are -

- ① Saddle - Its base portion, located across the lathe bed and carries cross slide and tool post, it can be moved longitudinally along the bed.
- ② Apron - It is attached to the saddle and appears as hanging on the front side. It consists of gears for motion transmission.
- ③ Cross Slide - It is mounted on top of the saddle and acts as support to compound rest.
- ④ Compound Rest - It is mounted on a cross slide and it consists of swivel and top slide. The tool post is mounted on the top slide.
- ⑤ Tool-Post - It is used to hold the tool position as per the requirement.