

Experiment - 1

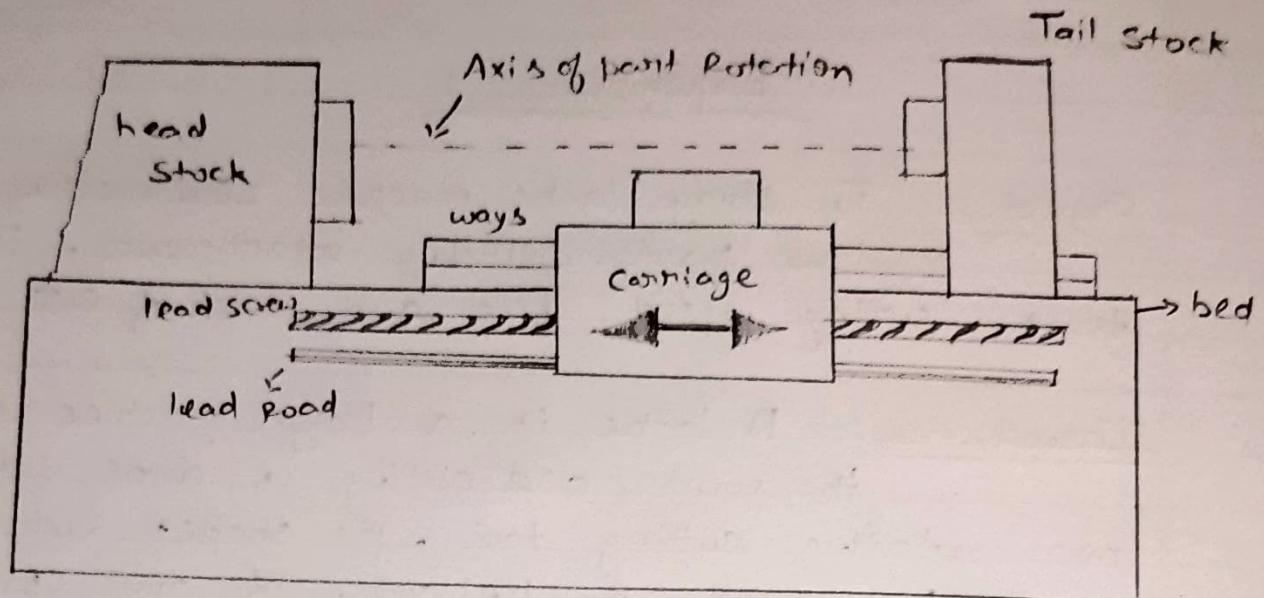
Object :- To study lathe machine construction and various parts including attachments, lathe tools, cutting speed, feed and depth of cut.

Introduction :- A lathe is a large machine that rotates the work, and cutting is done with a non-rotating cutting tool. The shapes cut are generally round, or helical. The tool is typically moved parallel to the axis of rotation during cutting, manual lathes have the following major components,

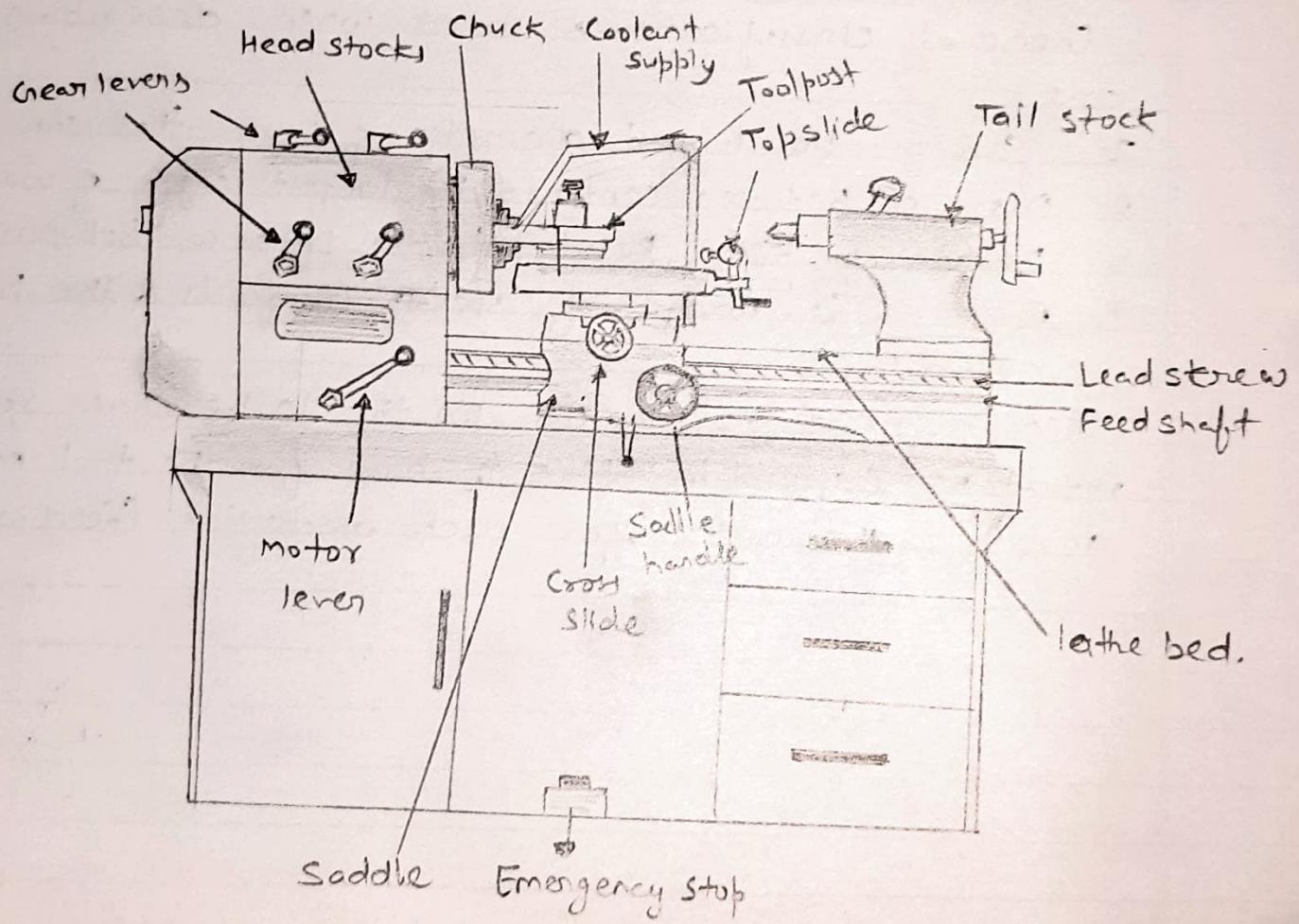
General classifications used when describing lathes are -

1. Swing - the largest diameter of work that can be rotated
2. Distance between centers - the longest length of work piece
3. Length of Bed - Related to the distance between centers
4. Power - The range of speeds & feeds & the horsepower available.

The critical parameters on the lathe are speed of rotation (speed in RPM) & how far the tool moves across the work for each rotation (feed in IPR)



Lathe machine



head stock - The end of the lathe contains the driving motor & gears. Power rotates the part & is delivered from here. This typically has levers the let the speeds & feeds be set.

Ways - These are hardened rails that the carriage rides on.

Tail stock - This can be used to hold the other end of the part

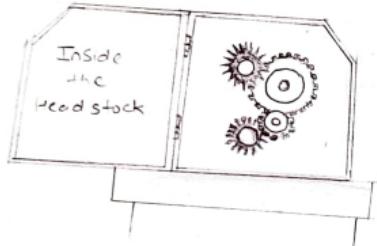
Bed - This is a bottom pan on the lathe that catches chips cutting fluids etc.

Carriage - This part of the lathe carries the cutting tool & moves based on the rotation of the lead screw or rod.

lead screw - A large screw with a few threads per inch used for cutting threads.

lead rod - A rod with a shaft down the side used for driving normal cutting feeds.

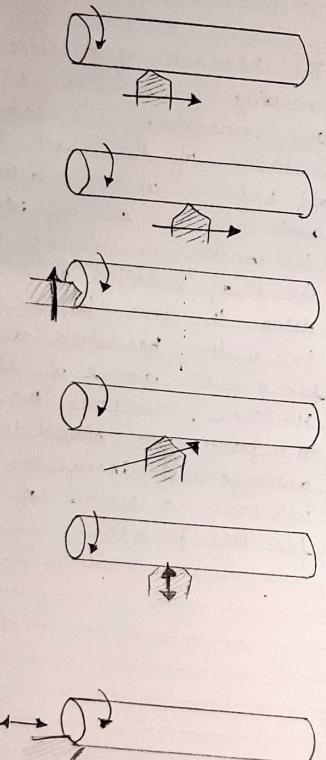
* The Centre Lathe The centre lathe is used to manufacture cylindrical shapes from a range of materials including; steels and plastics. Many of the components that go together to make an engine work have been manufactured using lathe. These may be lathe operated directly by people (manual lathes) or computer controlled lathes (CNC machines) that have been programmed to carry out a particular part (task). A basic manual central lathe is known as is shown below. This type of lathe is



controlled by a person turning the various handles on the top slide & cross slide in order to make a product / part.

The head stock of a centre lathe can be opened, revealing an arrangement of gears. These gears are sometimes replaced to alter the speed of rotation of the chuck. The lathe must be switched off before opening, although the motor should be automatically cut off if the door is opened while the machine is running (a safety feature). The speed of rotation of a chuck is usually set by using the gear levers. There are usually one on the top of the headstock or along the front and allow for a wide range of speeds.

However, sometimes the only way to set the lathe to a particular speed is to change the gear arrangement inside the head stock. Most machines will have a number of alternative gear wheels for this purpose.



Operation of Lathe:-

Operation of Lathe include -

Turning - Produce lathe a smooth and straight outside surfaces on a part

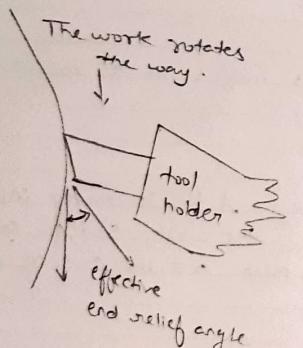
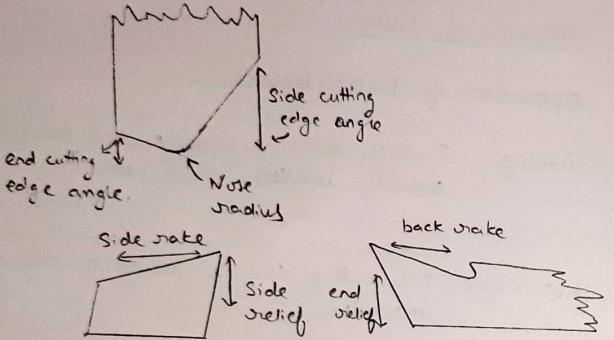
Threading - The cutting tool is moved quickly cutting threads.

Facing - The end of the part is turned to be square

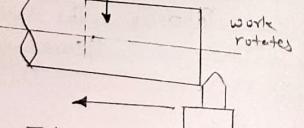
Tapering - The tool is moved so as to cut a taper (Cone shape)

Parting / Slitting / Grooving - A tool is moved in/out of the work. Shallow cut will leave a formed cut, a deep cut will cut off the unsupported part

Drilling / Boring - A cutter or drill bit pushed into the end to create an internal feature.

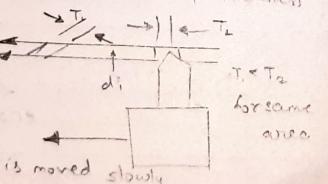


1. The angles edge allows a slow build up of cutting forces



Tool is moved slowly

2. Increase in the side rake angle reduces the chip thickness



Lathe Tools:-

A lathe tool bit it shown in the figure below, with a few terms defined.

In general, as the rake angle is increased (positive) the cutting forces are reduced, the surface finish improves and tool life increase.

The side edge angle has two effects outlined below:

The end relief angle prevents friction on the flank of the tool. The holder for the bit is often angled, and the best end relief angle must be larger than the tool holder angle to prevent rubbing. The side relief angle has to a friction similar to the end relief, this angle must exceed the feed helix angle, increasing the nose radius improves the surface finish, but this reaches a limit.

Feeds and Speeds:- If we consider the speed & feed of a lathe.

1. Spindle speed is in revolution per minute.
2. Feed is in inches per revolution.

Viva Question

Q1 What is the production? Discuss about it?

Ans Production in mechanical engineering is the process of designing, making and operating machinery & system. It's also known as manufacturing or industrial engineering. It includes application of castings, joining process, metal cutting & tool design, metrology, machine tools, automation, jigs & fixtures die etc.

Q2 Discuss about the various lathe operations?

Ans Lathe operations includes turning, facing, grooving, reaming & knurling. These operations are performed on lathe machine, which rotates a workpiece on its axis.

Facing - Used to create flat surface on the end of job.

Reaming - Used to enlarge a hole in a job.

Grooving - Used to create a narrow groove on the surface of a cylindrical workpiece.

Turning - Used to create a narrow groove on the surface of a cylindrical job.

Knurling & Sanding: etc
etc.

Q3 Discuss about depth of cut, feed & speed?

A3 In machine, 'Depth of cut' refers to the amount of material removed from a job with each pass of cutting tool.

'Feed' represents the distance the tool travels per revolution

'Speed' signifies the cutting speed at which the tool moves across the workpiece surface.

Q4 What is lathe? Its classify.

Lathe are machine tools that shaped materials by rotating them against cutting tools. They can be classified by Type, size and automation.

Type

Engine lathe → most common type

Turret lathe → used for mass production.

Bench lathe → Small, hand operated

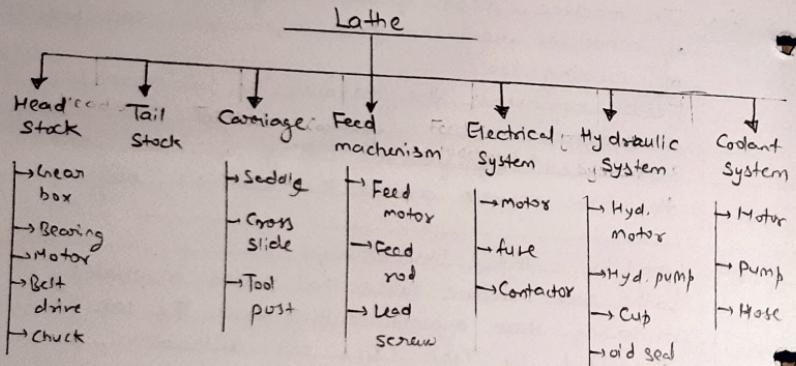
Vertical lathe → Used to turn large diameters.

Size

Oil field lathes

(very large spindle bore & chuck)

Q5



Parts of Lathe Machine

Automation-

Automatic lathes \Rightarrow Heavy duty machine. that can change

cutting & tooling automatically.

CNC lathe \Rightarrow Controlled by a computer.

Screw machines \Rightarrow Fully automatic.

use cams & gear trains.

Q5

Ans

discuss the various parts on lathe machine'