

# INTRODUCTION

Machine shop forms not only important parts but an indispensable part of any modern workshop. The operations performed in this jobs are capable of producing a large number of difficult shapes and size having a fine finish within a very slow limit of dimontion.

In a machine shop, machine tools and cutting tools are used to make parts usually of metal or plastic. The production consists of cutting, shaping, drilling, finishing and other purposes. A machine shop can contain some raw materials and an inventory of finished parts.

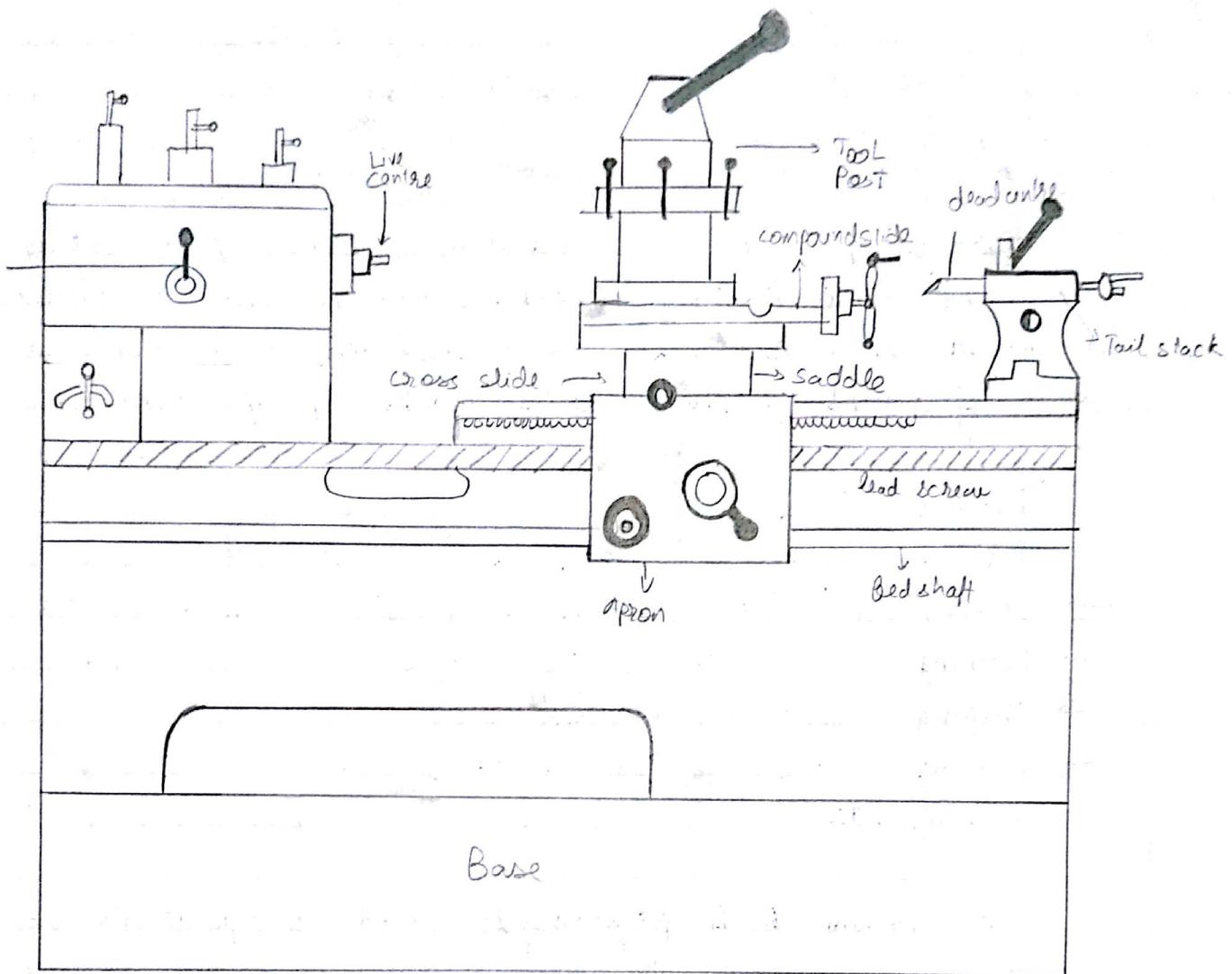
# METAL CUTTING

The operation of removing the metal by means of a cutting tool using some part of machine tool in order to obtain a desired shape and size having a finish within very low limits of dimension. This includes number of operations

- Turning
- Drilling
- facing
- Planing
- Shaping
- Milling
- Grinding etc.

All machine tools performs some kind of operations to produce desired shape. The shapes which commonly generated through this metal cutting operations are flat, cylindrical, or spherical or any combination of these.

These shapes are a result of desired movement of machine and job.



Lathe machine

# LATHE MACHINE

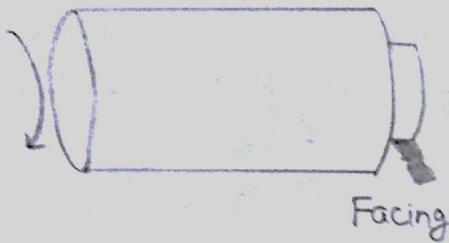
Lathe is one of the most important machine tool in metal working industry. A lathe operates on the principle of rotating workpiece and a fixed cutting tool. The cutting piece is fed into the workpiece which rotates about its own axis, causing workpiece to be formed to the desired shape.

Explanation of standard components of lathe machine :

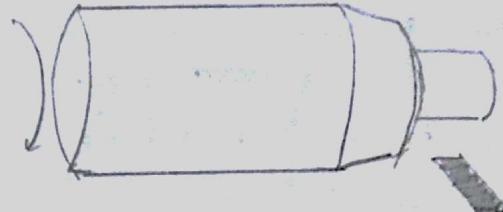
BED :- Usually made of cast iron. Provides a heavy rigid frame on which all the main components are maintained.

WAYS :- Inner and outer piece that are precise

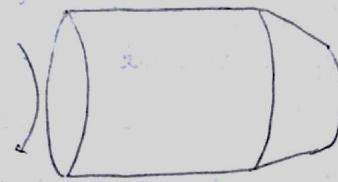
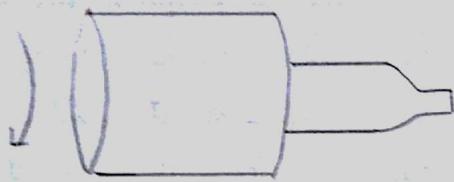
HEAD STOCK :- Mounted in a fixed position on the inner rail, usually at the left hand. Using a chuck it rotates the work



Facing



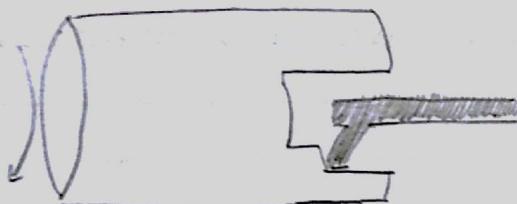
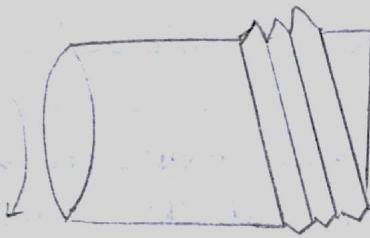
Taper Turning



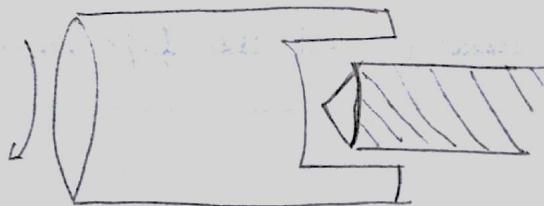
Threading



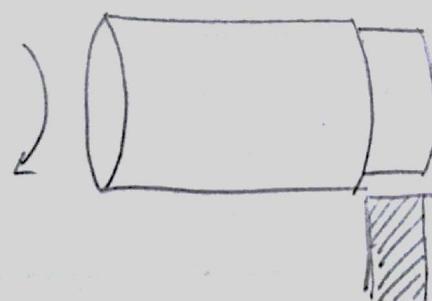
Cut off



Boring



Drilling



Knurling

# LATHE MACHINE OPERATIONS

Plane Turning :- Turn the same diameter along the length of a workpiece is known as plane turning. It is also known as parallel turning. This tool is fed parallel to the workpiece.

Facing :- An operation through which flat surface normal to the axis of the workpiece is performed at the end of the face of the work. The tool is fed across the axis of the work.

Taper Cutting :- A gradual reduction in the diameter of a workpiece either along full length or only a limited strength.

Boring :- It is the operation of enlarging a drilled hole by using a solid boring bar.

Gear Box :- Inside the headstock, providing a multiple speeds with a geometric ratio of moving lever.

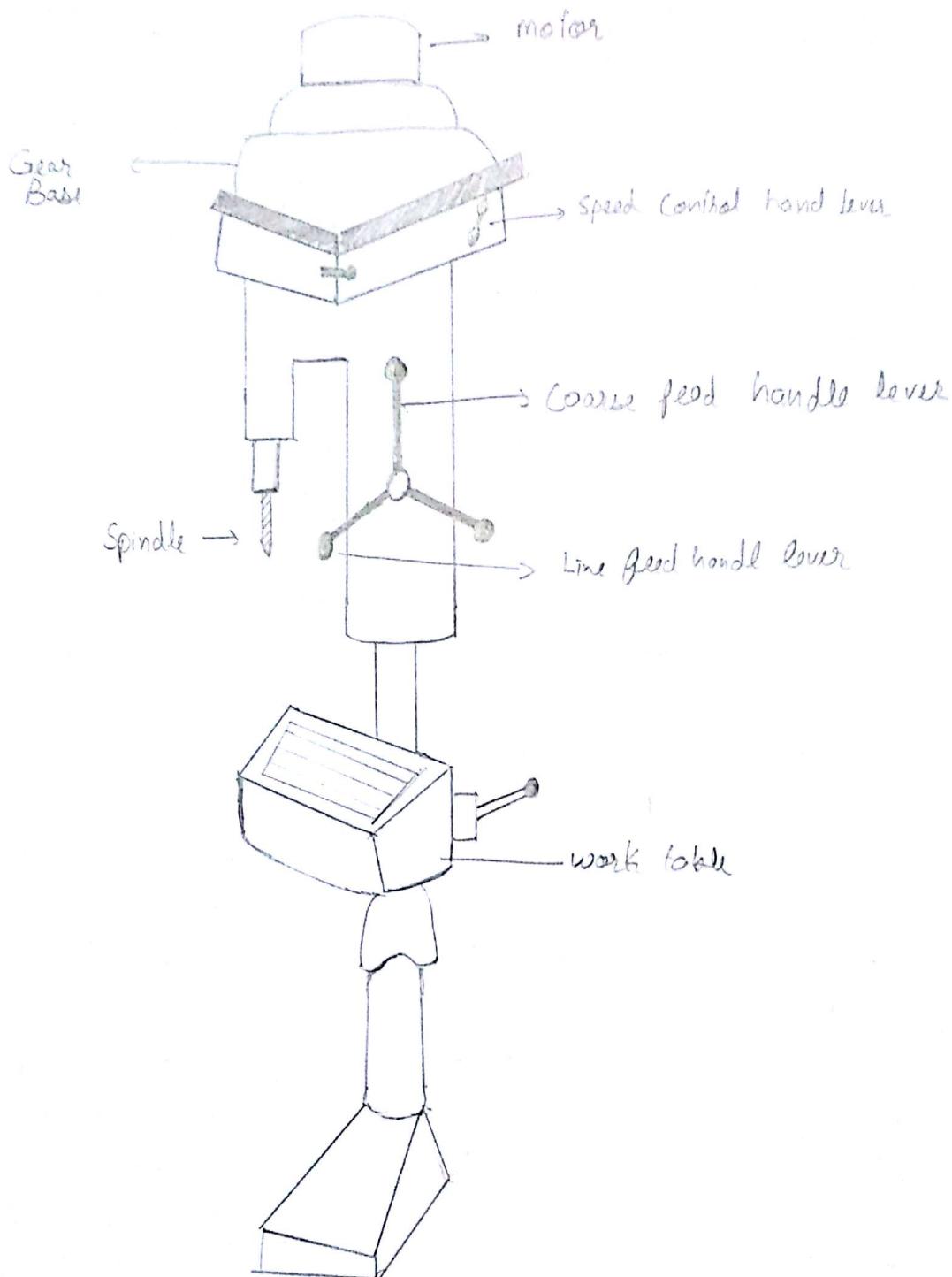
Spindle :- Hole through the headstock to which stock can be fed, in which all shafts that are upto two times the limits. Centre lathe is to be worked on one end at a point.

Chuck :- Three jaws to clamp part to be worked on.

Tail Stock :- Fits on the inner ways and can slide towards any position, the headstock to feed the length of the workpiece. An optional taper turning attachment would be mounted on it.

Tail Stock Quill :- Has a more taper to hold a lathe centre, drill fit and other tools.

Reaming :- It's a finishing operation performed to provide a superior surface finish to a desired and bored hole. The setup looks similar to a drilling station.



Pillar Drill Machine

Forming :- It is also known as form turning. The forming is an operation that produces a convex, concave, or any irregular profile on workpiece.

Parting off :- Parting uses a blade like cutting tool plunged into the workpiece to cut off the workpiece at specific angles and length. It is normally used to remove the finished end of a workpiece from the bar stock that is clamped in the chuck.

Threading :- Also known as cutting operation. This operation will be performed on the outside of workpiece is called external threading.

## PILLAR DRILLING MACHINE

Drilling is an operation of producing or generating a round hole in a workpiece by facing one end cutting, by a rotating tool called drilling machine. In drilling either job is moved along axis. The cutting tool is used in operations called drill set or simply as drill.

In pillar drill machine, the drilling tool is held in the drill chuck and movements are given to it by means of feed handle to fed the revolving job into workpiece handled on lathe machine. To drill the required hole, pillar drill machine used for high and precision work and normally available in training workshop.

## FUNCTIONS OF DRILL MACHINE :-

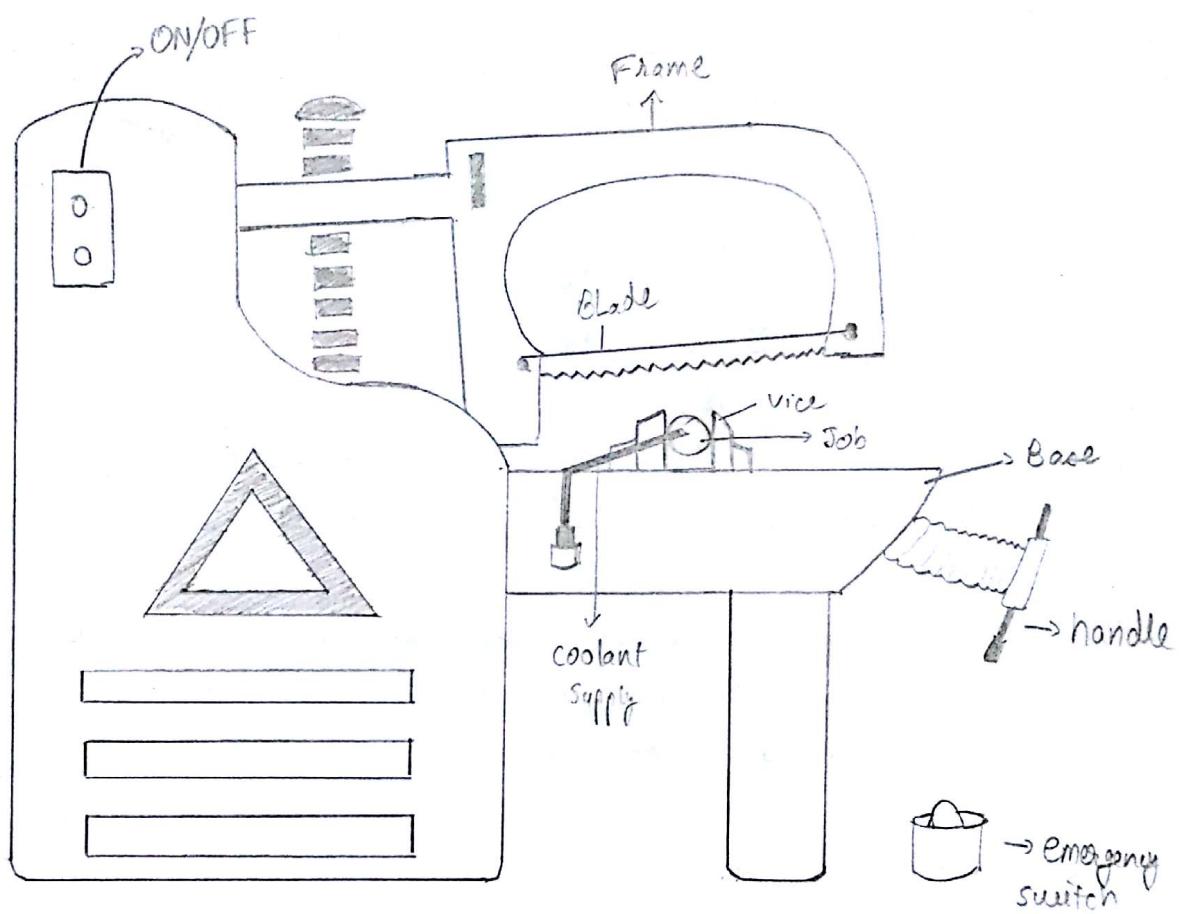
Drilling :- It is an operation of producing a cylindrical hole by means of revolving tool in solid body. This moving tool is called drill.

Reaming :- It is an operation of finishing a drill by means of a tool called reamer.

Boring :- It is an operation of enlargement of a drilled hole connecting its size and producing better finish.

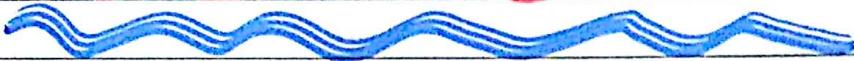
Counter sinking :- It is an operation in which squaring up the surface at the end of hole is done to produce a fine seat to a bolt head.

Tapping :- The operation of internal thread in hollow compounds with help of this tool. It is not enlarged to remove much metal.



Power Hacksaw

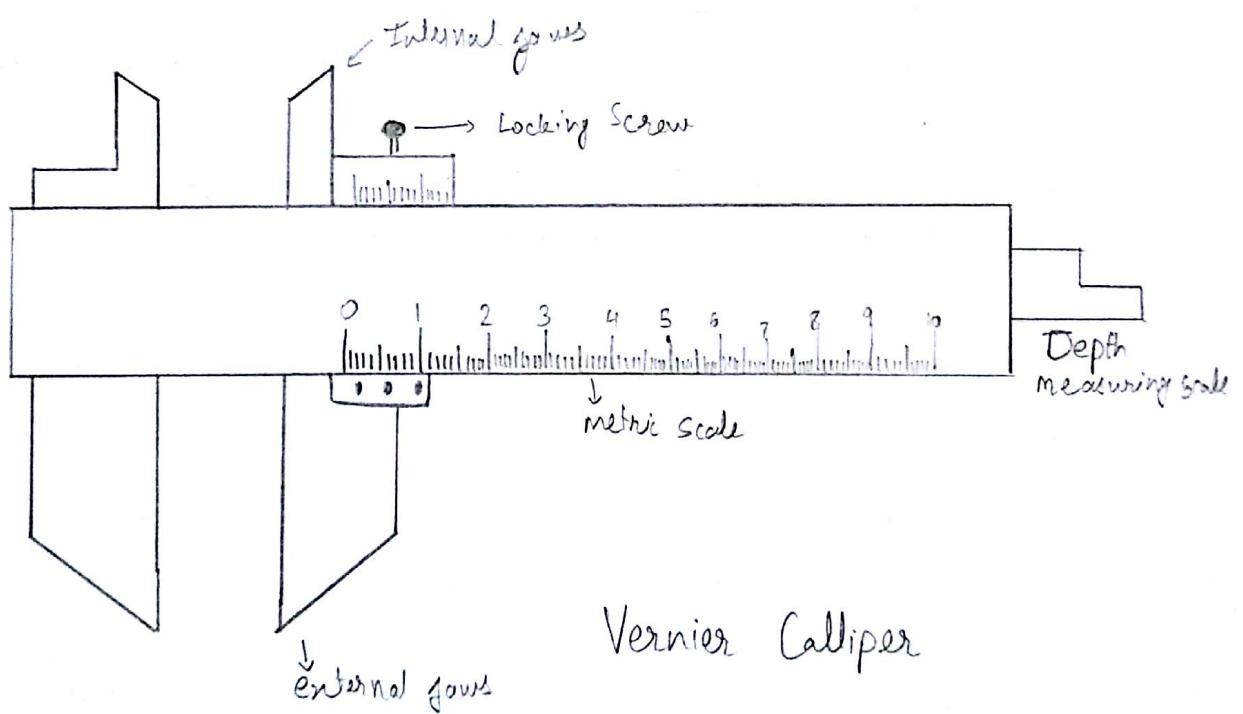
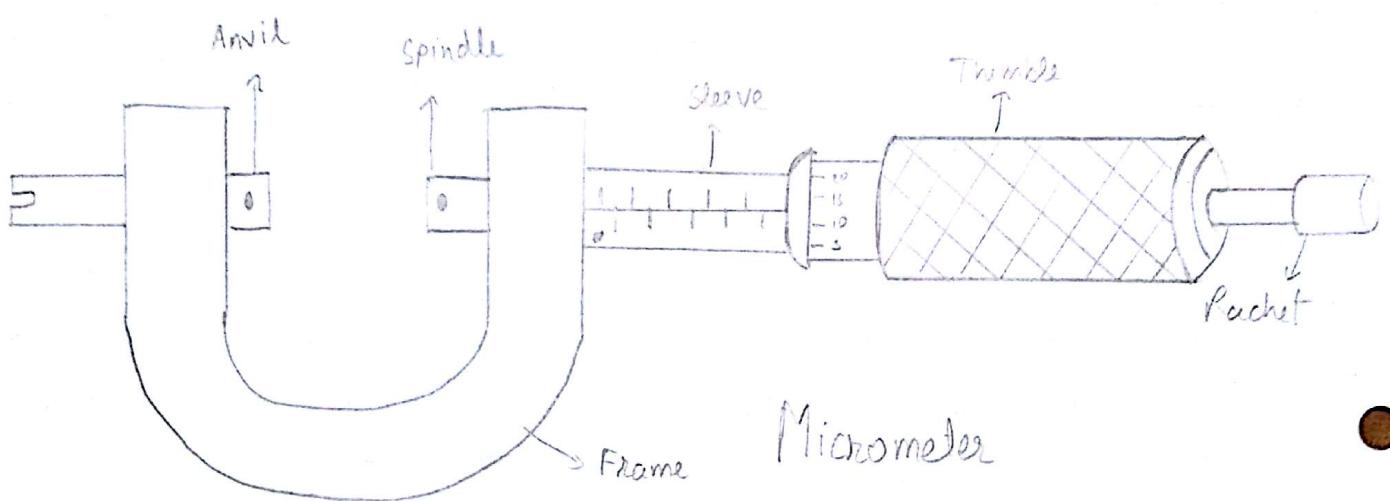
# POWER HACKSAW



Power hacksaw is used to cut large size of metal such as steel, cutting diameter more than 10-15 mm is very hard with the normal hand held hacksaw. Therefore, power hacksaw have been developed to carryout the difficult time consuming work.

Power hacksaw is used to cut large sections of metals such as steel pieces, hard iron and other materials. These materials having thickness more than 10-15 mm can easily be cut which may be difficult with normal cutting machine on hacksaw.

Top gravity blades are made from high quality steel - carbon steel blades are manufactured from HSS.

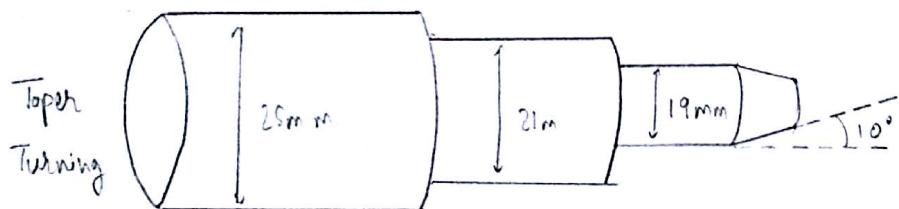
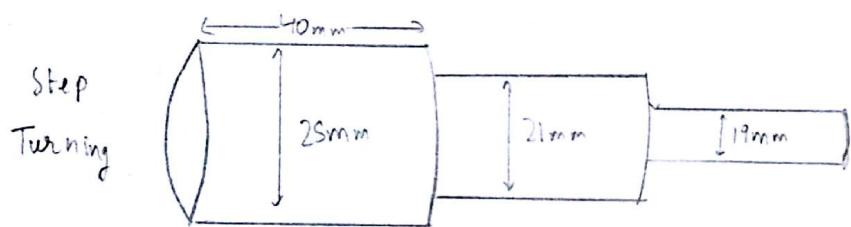
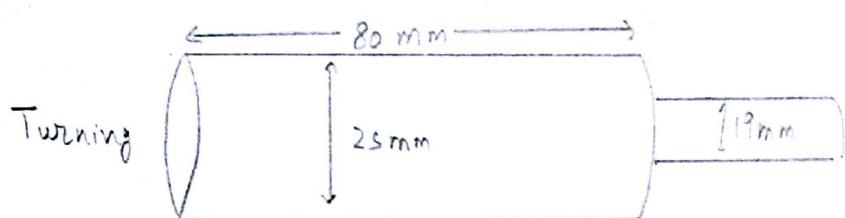
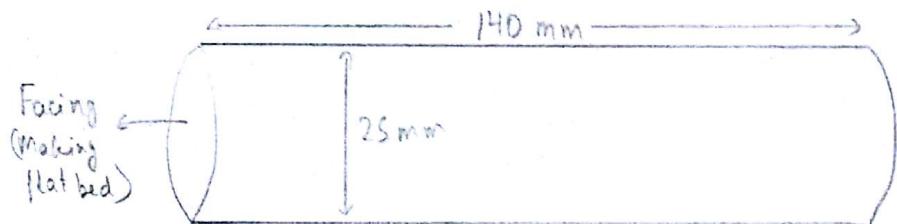


# JOB MEASURING INSTRUMENTS

Micrometer :- Also known as screw gauge, is a device used in operating a calibrating screw for precise measurement of small distance in machine such as dial, digital callipers. It consists of hollow cylinder attached to a ratchet, which is meant for fine adjustment. The U-frame consists of a flat end and screw on other end.

Vernier Callipers :- It is a device that let the user to measure more accurately than that could be done by reading a uniform divided straight or circular measurement scale. It is the scale that indicates where the measurement lies in between the two of main marks or main scale. They are common on specific instrument used to conduct experiment tool etc. It works as the human eye can detect the two fine segments aligned.

Aim: To Obtain required shape on the cylindrical workpiece



# JOB - 1

AIM - To obtain required shape on the cylindrical work piece with given length

TOOLS - Lathe machine, Steel bar, Right hand cutter, bear key, vernier calliper

## PROCEDURE -

- 1) The workpiece is held in chuck and the facing tool is fed from the outside centre of workpiece towards the cutting surface to the centre, with the help of cross slide. After that punch the roll no. on that side of the rod on which facing is done
- 2) Turn ON the lathe machine and advance the tool until it touches the centre of workpiece and then move the lathe in opposite direction until it crunch the last edge of work piece
- 3) Repeat the steps until the smooth finish is obtained on the face
- 4) Punch roll no. on the facing side
- 5) Mark two sections of 40 mm on the workpiece
- 6) Workpiece is to be held by the chuck.
- 7) place the tool slightly so that it touches the work piece
- 8) Bring back tool in that position and give perpendicular feed of 10 mm
- 9) move the carriage slowly towards job till 40mm and bring it back
- 10) Repeat these steps again and again till diameter of 21 is achieved



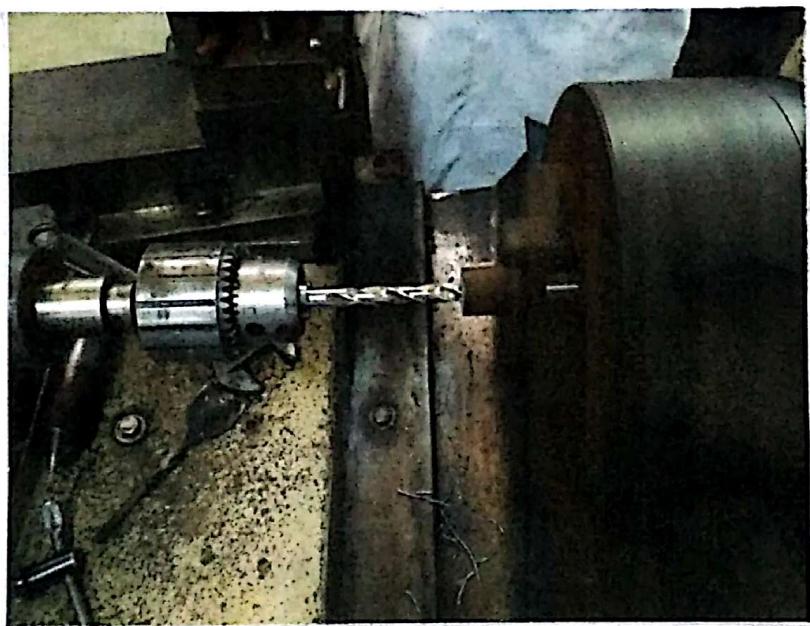
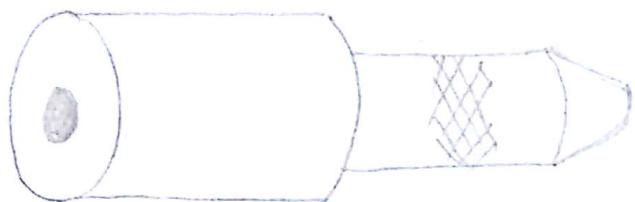
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- (1) Mark the other cut to make diameter 19mm at the first half
- (2) At last make a taper turning at an angle of 10°
- (3) Turn off the lathe machine
- (4) The job is completed.

#### PRECAUTIONS :-

- 1) Always use the Reverse button to switch ON and STOP button to stop the lathe machine
- 2) Don't leave T-spanner into the chuck
- 3) Tight the cutting tool
- 4) Clamp the job tightly in chuck with T-spanner

Aim:- To perform Knurling, grooving and drilling operations



## JOB - 2

AIM - To perform knurling, grooving, and drilling operations

TOOLS - Lathe machine, steel bar, box key, Vernier callipers, knurling, grooving, and drilling tools.

### PROCEDURE -

#### Knurling -

- 1) The workpiece is held in the chuck and the lathe machine is switched ON
- 2) Press the knurling button tool against the workpiece
- 3) The chuck revolves at slow speed.
- 4) The tool is then pressed against the workpiece and pressure is increased until the required pattern is obtained.
- 5) Finally the knurling is done.

#### Grooving -

- 1) place the workpiece in chuck
- 2) Hold the grooving tool perpendicular to the surface where grooving has to be done.
- 3) Turn ON the machine and move the carriage slowly towards the job till a depth of 1mm has been obtained



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### Drilling -

- 1) Hold the workpiece inside the chuck
- 2) Drilling is done on the non finished side.
- 3) Hold the drilling tool in the tail stock
- 4) Turn ON the lathe machine
- 5) slowly advance the drilling tool towards the centre and drill it
- 6) The job is complete

### PRECAUTIONS -

- 1) Don't leave T-spanner into the chuck
- 2) Tight the cutting tool properly
- 3) Don't touch the job while operation
- 4) Don't touch the job while rotating.