

E-CONTENTS
OF
WORKSHOP
TECHNOLOGY – II

CHAPTER– 1(CUTTING TOOL AND TOOL MATERIALS)

1.1 CUTTING TOOLS AND ITS TYPES

The tool which are used for the purpose of cutting the materials in the desire shape and size are called cutting tool.

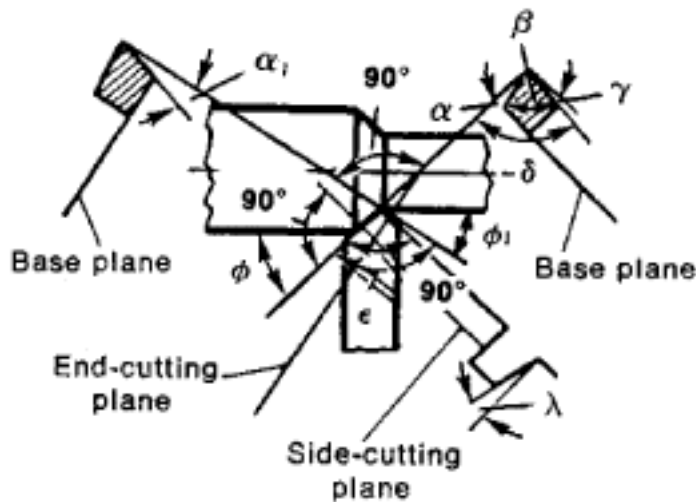
1.1.1 SINGLE POINT CUTTING TOOL

The cutting tool terminating in a single point are termed as a single point cutting tools. These tool are used on lathes, shaper, planers etc.

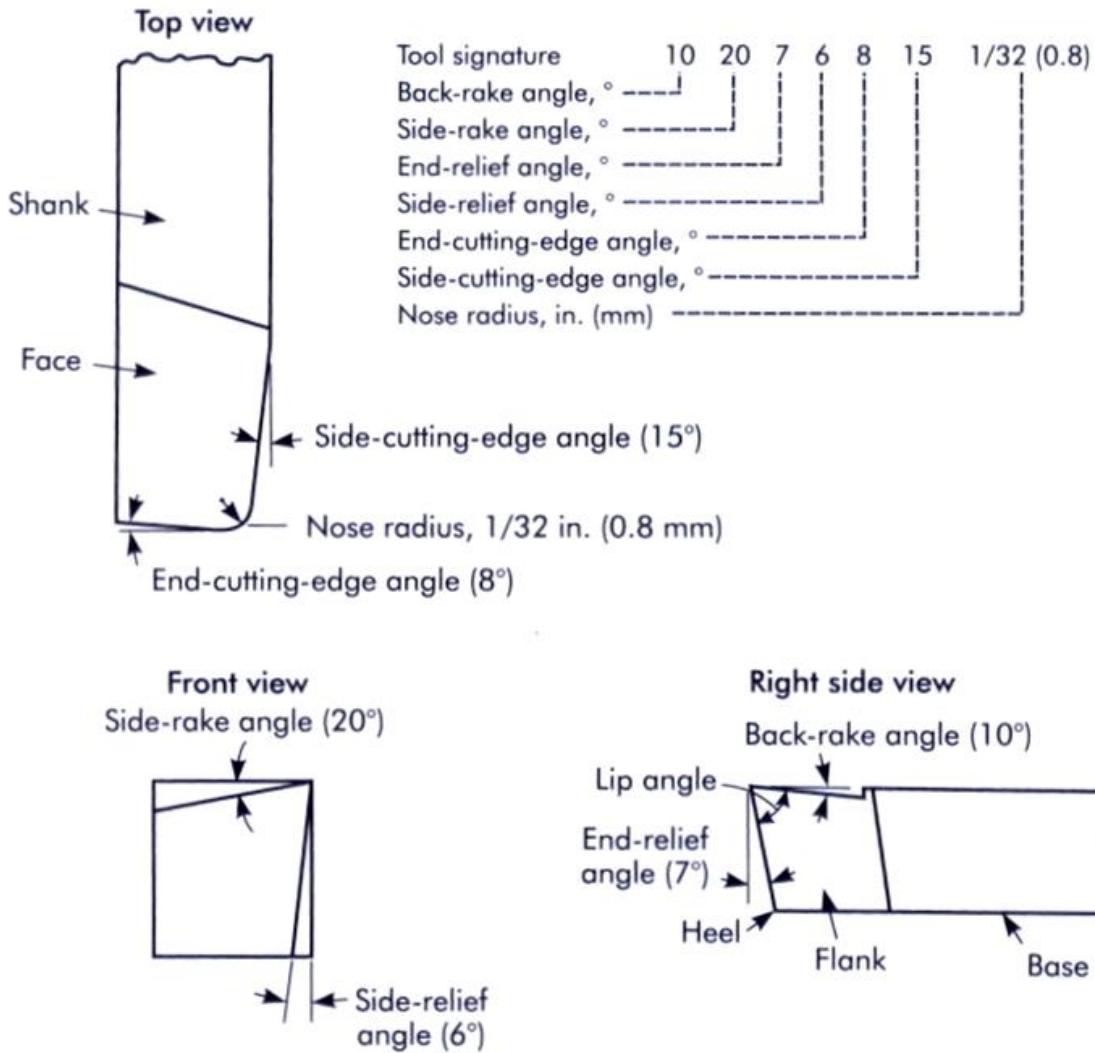
1.1.2 MULTI POINT CUTTING TOOL

The cutting tool being composed of more than one single point are termed as multi point cutting tool. e.g. milling, cutter, drills, broaches, grinding wheels etc.

1.2 SINGLE POINT CUTTING TOOL GEOMETRY



1.3 TOOL SIGNATURE



1.4 CUTTING SPEED

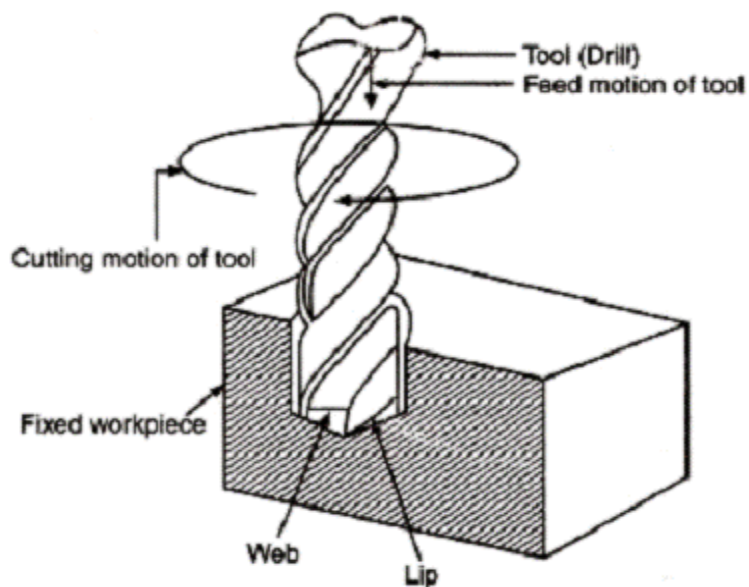
Cutting speed of a cutting tool may be define as the speed at which the cutting edge passes over the material.

1.5 DEPTH OF CUT

The perpendicular distance measured from the machined surface to the un-cut surface of the work piece.

CHAPTER – 2 (DRILLING)

2.1 PRINCIPLE OF DRILLING-Drilling machine is used to produced hole in the work piece. The end cutting tool used for drilling holes in the work piece is called the drill.



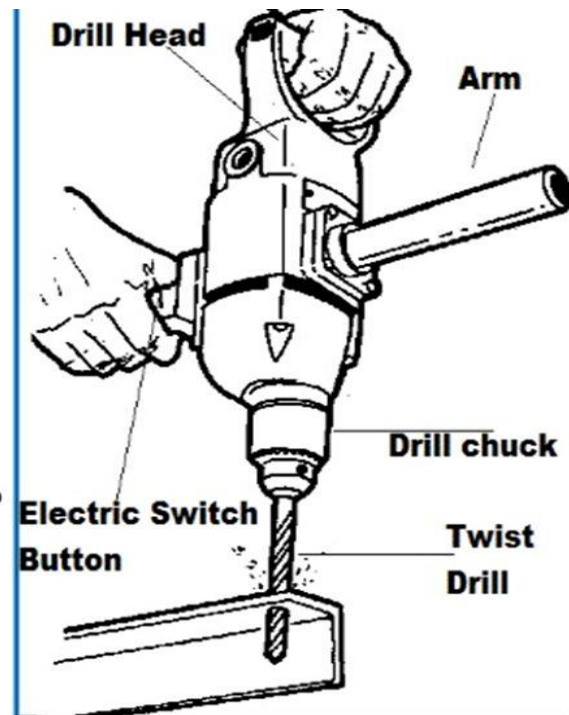
2.2 CLASSIFICATION OF DRILLING MACHINE

2.2.1 Portable Drilling Machine.

This is a small drilling machine which can be easily carry to work piece. It is a generally employed for drilling hole.

PORTABLE DRILLING MACHINE

It is a very small, compact and self contained unit carrying a small electric motor inside it. It is very commonly used for drilling holes in such components that cannot be transported to the shop due to their size or weight or where lack of space does not permit their transportation to the bigger type of drilling machine. In such cases, the operation is performed on the site by means of the portable electric drill.



2.2.2 SENSITIVE OR BENCH DRILLING MACHINE

It is light and simple drilling machine of a small height. It is usually fitted on a bench and hence, it is called bench drilling machine.

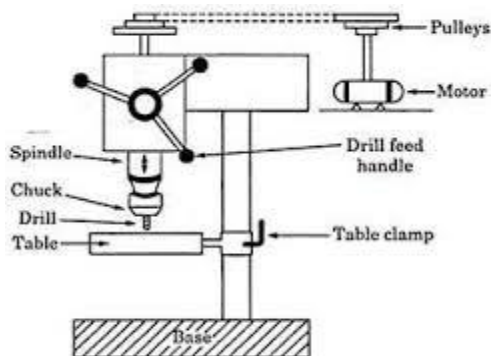


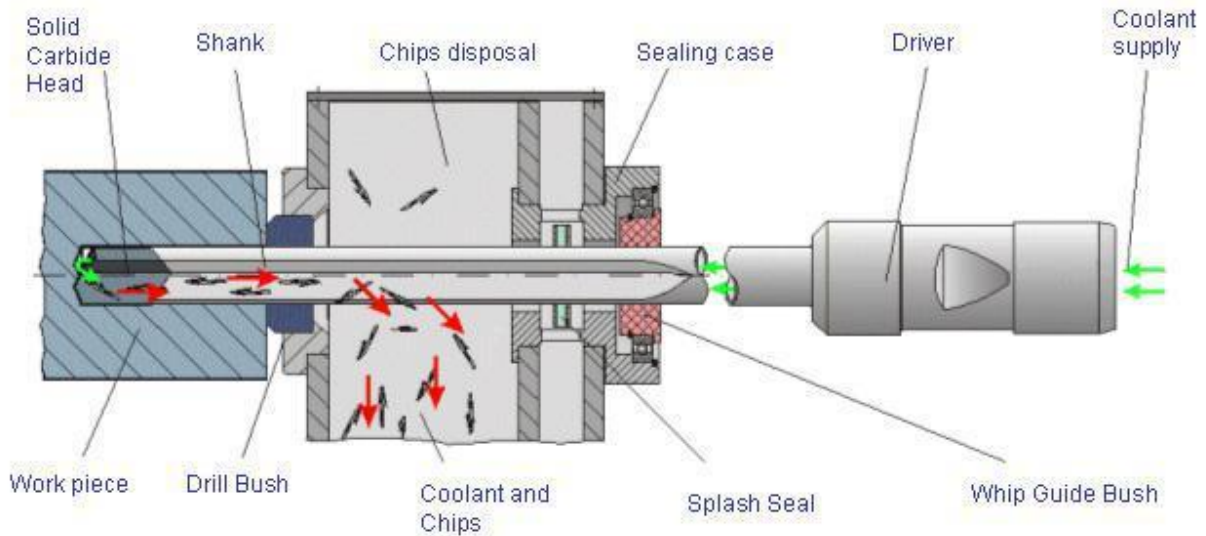
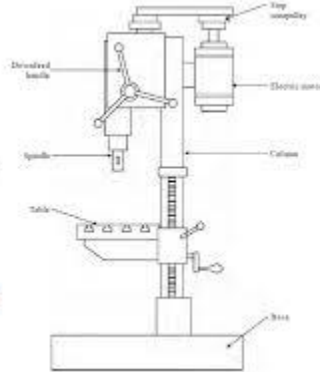
Fig. 18.1. Block diagram of bench drilling machine.

2.2.3 UPRIGHT DRILLING MACHINE –

This machine derives its name from the fact that it has got considerable height and the table seems to be standing quite above the base.

3) Upright drilling machine:-

- Drill holes up to 50mm
- Table can move vertically and radially



2.2.4 DEEP HOLE DRILLING MACHINE

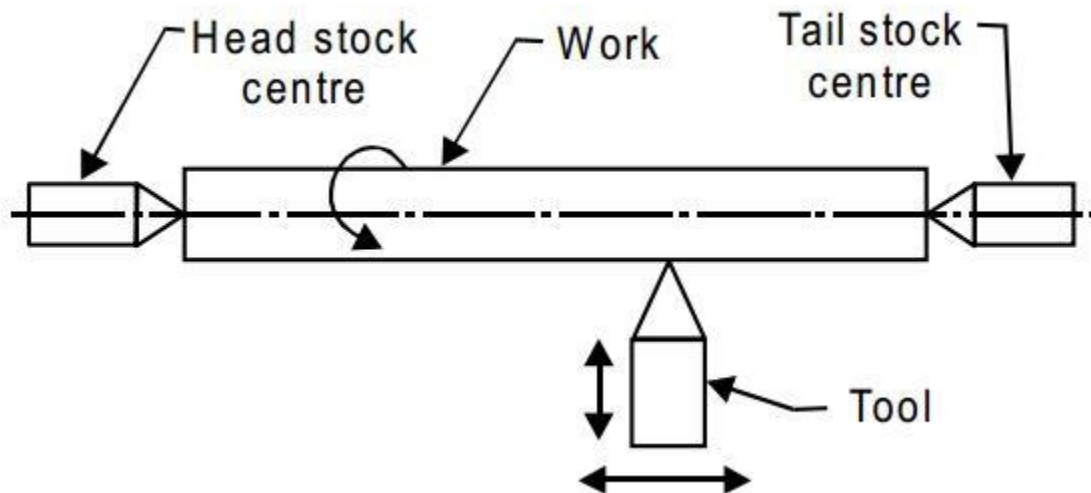
This is used where very long holes of relatively smaller diameter are required on jobs such as long shafts, long spindles and rifle barrels.

CHAPTER-3 (LATHE)

3.1 INTRODUCTION - A lathe is one of oldest and perhaps the most important machine tool ever developed. Lathe is a machine tool which removes undesired material from a rotating work machine in the form of chips with help of a tool which is traversed a cross the work piece and can be fed deep into the work

3.2 PRINCIPLE OF TURNING

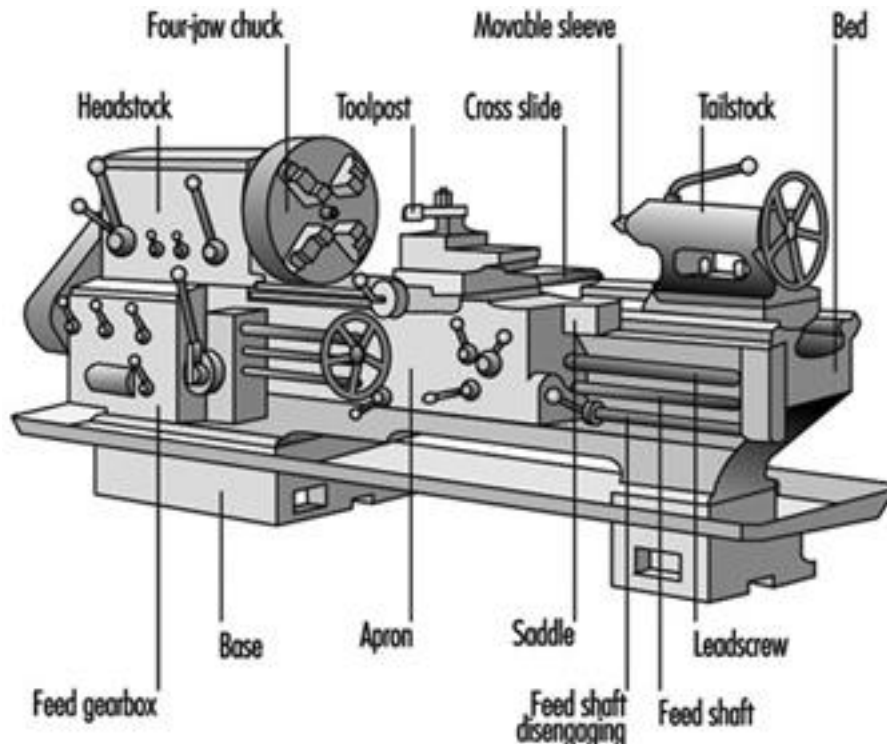
In a lathe, work is held between two rigid and strong support called Centres or in a face plate. The chuck or face plate is mounted on the spindle of the lathe.



3.3 REQUIRMENTS OF LATHE MACHINE TO REMOVE METAL

- (a) Tool must have sharp cutting edge .
- (b)Both tool and work piece should be held rigidly.
- (c) Tool much be made of harder material than work piece.
- (d) There must be relative motion between job and tool.

3.4 PRINCIPLE PARTS OF A LATHE AND THERE FUNCTIONS

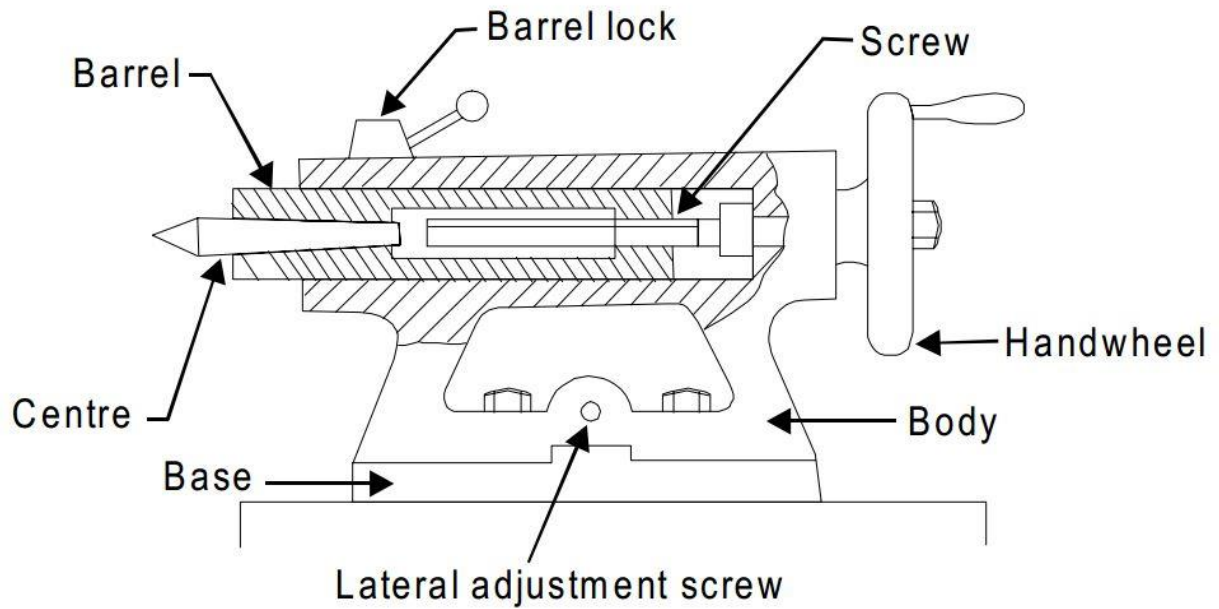


3.5 THE MAIN PARTS OF LATHE MACHINE

3.5.1 BED- The bed is the base of foundation of the lathe. It is a heavy and rigid casting made in one piece to resist deflection and vibration. It holds or supports all other parts i.e. head stock, tailstock, carriage etc.

3.5.2 HEAD STOCK- The headstock assembly is permanently fastened to left hand end of the lathe. It serves to support the spindle and driving arrangements.

3.5.3 TAILSTOCK – It is an important part of lathe machine made of cast iron or mild steel. It is located in the innerways of lathe bed at the right hand end of the bed.



3.5.4 TOOL POST – It is mounted above the compound rest. A T-slot is machined in the compound rest to accommodate the tool post. It serves to rigidly clamp the cutting tool or the tool holder in a desired position.

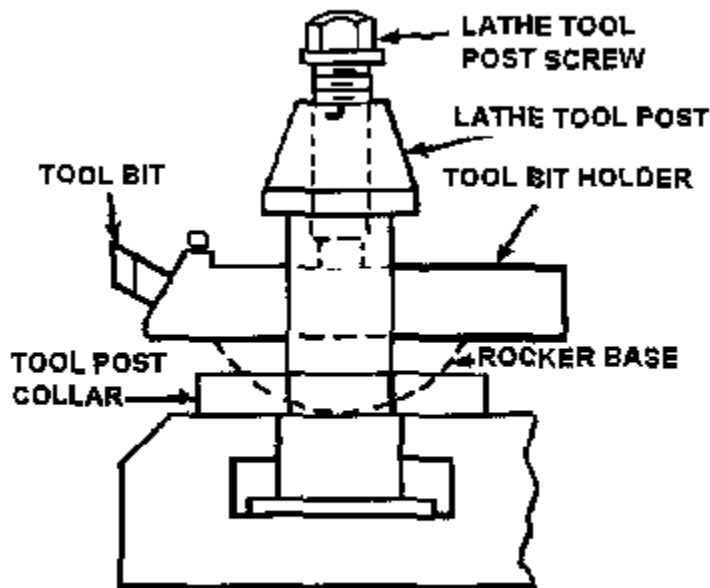
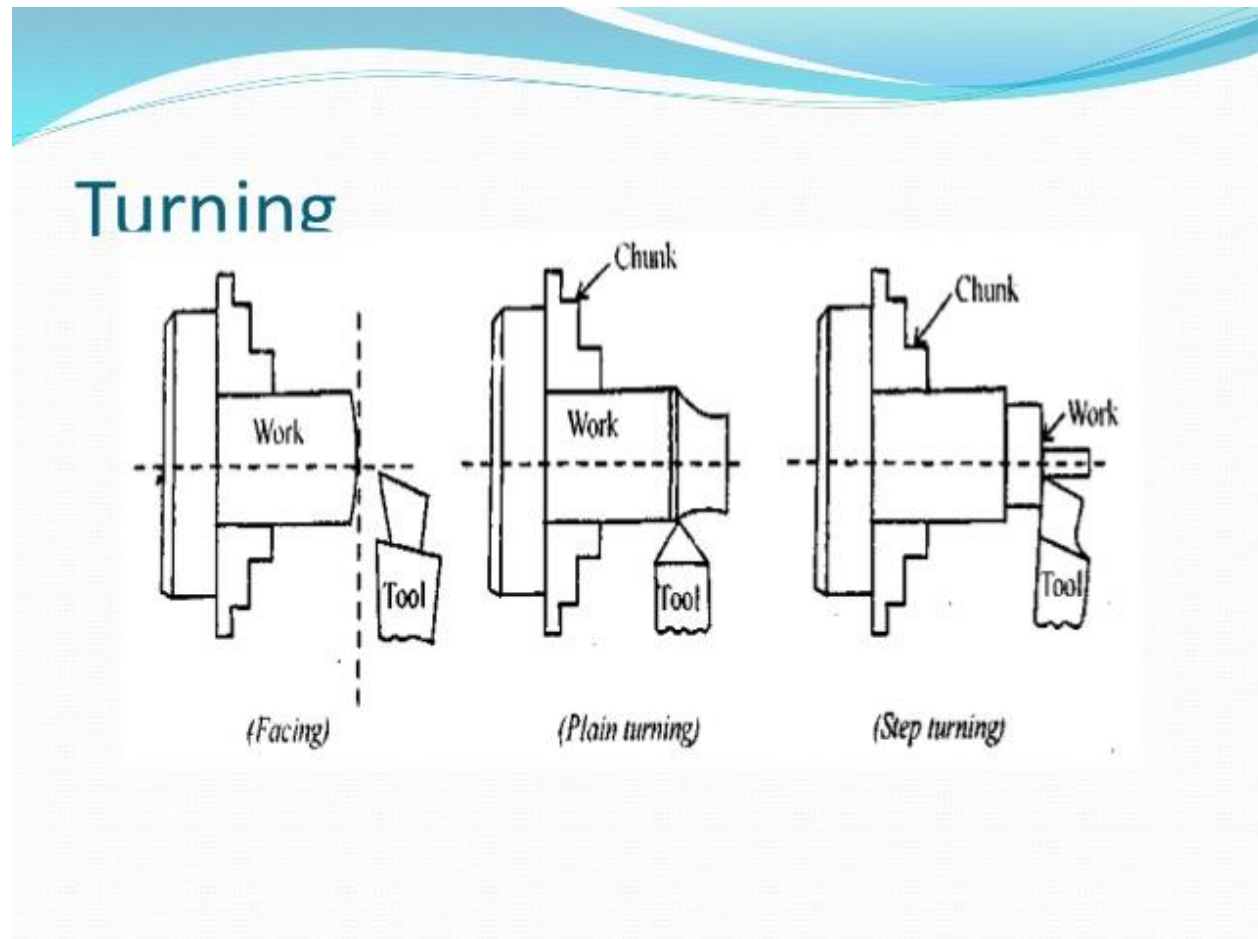


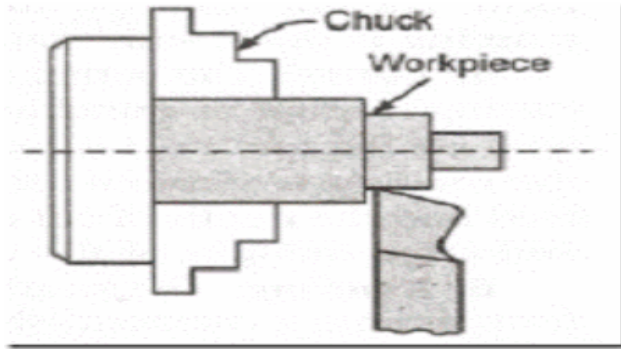
Figure 7-15. Standard round tool post.

3.6 LATHE OPERATIONS

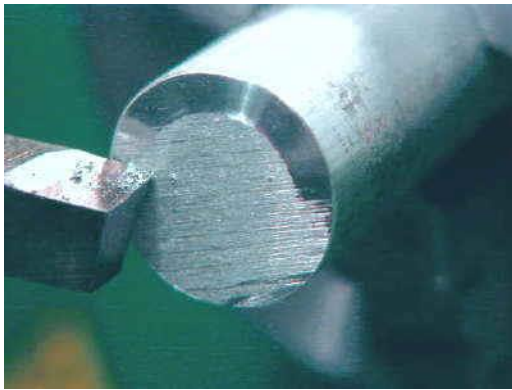
3.6.1 PLAN TURNING- It is an operation of removing excess amount of material from the surface of the cylindrical work piece.



3.6.2 STEP TURNING – It is also known as shoulder turning. It is the plan turning operation at different length with varied diameter on same work piece.



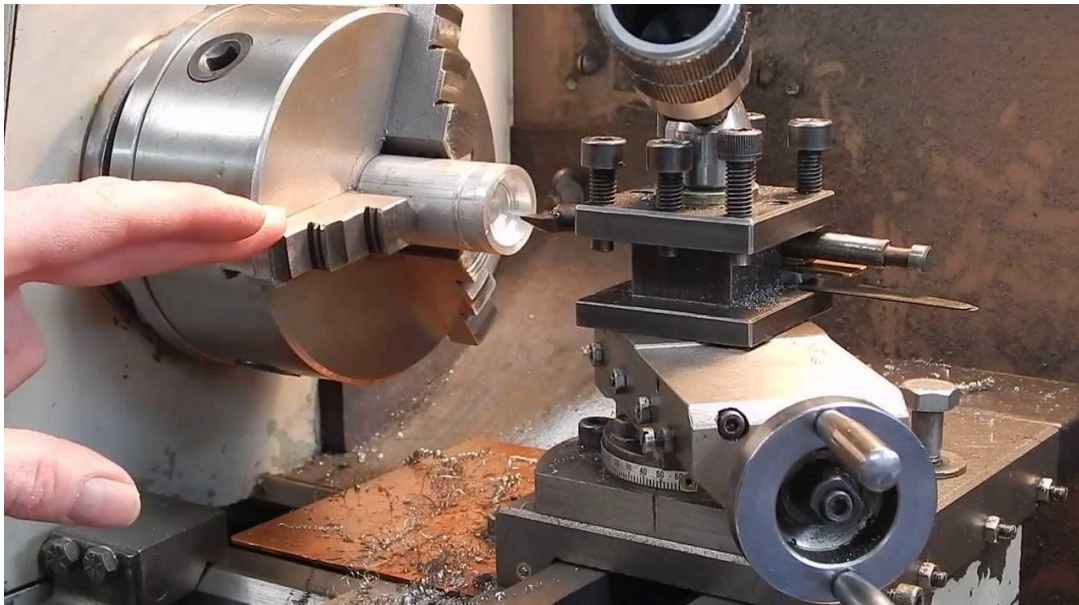
3.6.3 FACING – The lathe operation of finishing the ends of the work to make the end flat and smooth and to make the piece of required



CHAPTER– 4 (BORING)

4.1- INTRODUCTION- The process of enlarging the existing hole with single point cutting tool either by revolving the tool or job is called boring.

4.2 PRINCIPLE OF BORING- In horizontal boring machine, the work piece is held on the machine table and kept stationary, while boring tool revolves.



4.3 BORING TOOL- A boring tool consists of a single point cutting tool held in a tool holder known as Boring Bar.

THESE ARE TWO TYPES

- (a) Rotating type.
- (b) Non-rotating type.



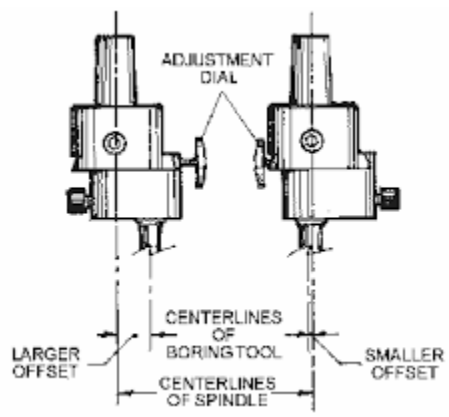
4.4 BORING BARS

A boring bar carrying a cutter or cutters tools enable holes to be bored is known as a boring bar.



4.5 BORING HEAD

A head like a part used for clamping boring tool inside it to perform a boring operation on a boring machine is known as Boring Head.



CHAPTER– 5 (SHAPING AND PLANNING)

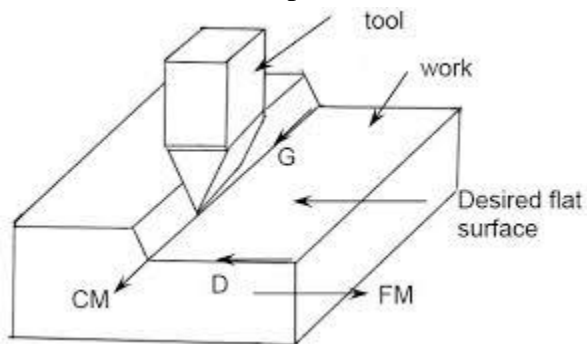
5.1 INTRODUCTION - The shaper or shaping machine is a reciprocating type of machine tool use of producing small flat surface with the help of a single point cutting tool reciprocates over the stationary work piece.

5.2 EXAMPLE OF SHAPER WORK

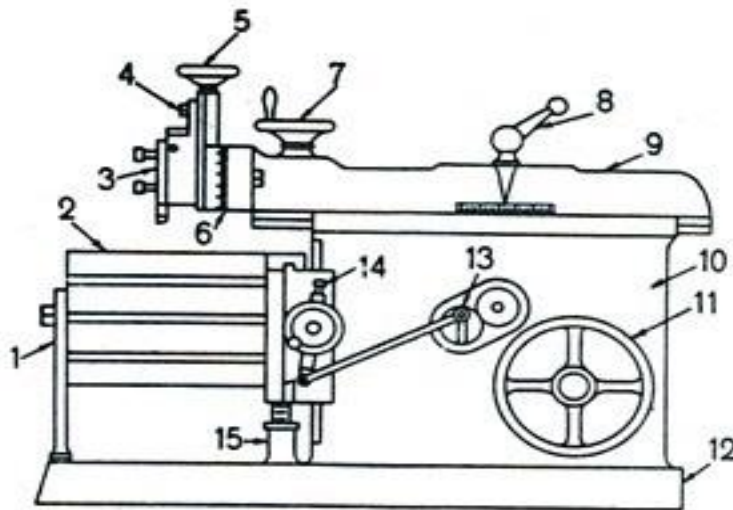
- (a) Shaping of vertical groove.
- (b) Shaping horizontal flat surfaces.
- (C) Shaping in V-block.

5.3 WORKIN PRINCIPLE OF SHAPER

The job is held on a suitable device clamped rigidly on the machine table. The cutting tool is held in the tool post mounted on the ram of the shaper.



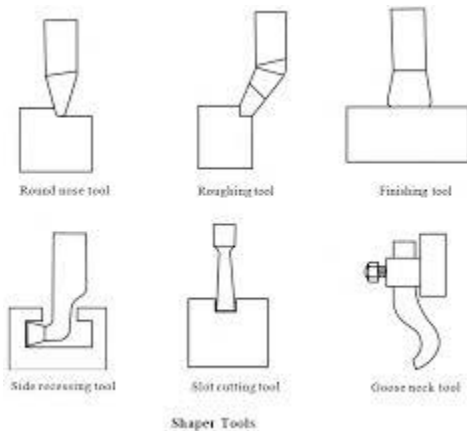
5.4 PRINCIPLE PARTS OF A SHAPING MACHINE



1. Table support, 2. Table, 3. Clapper box, 4. Apron clamping bolts, 5. Downfeed hand wheel, 6. Swivel base degree graduations, 7. Position of stroke adjustment handwheel, 8. Ram block locking handle, 9. Ram, 10. Column, 11. Driving pulley, 12. Base, 13. Feed disc, 14. Pawl mechanism, 15. Elevating screw

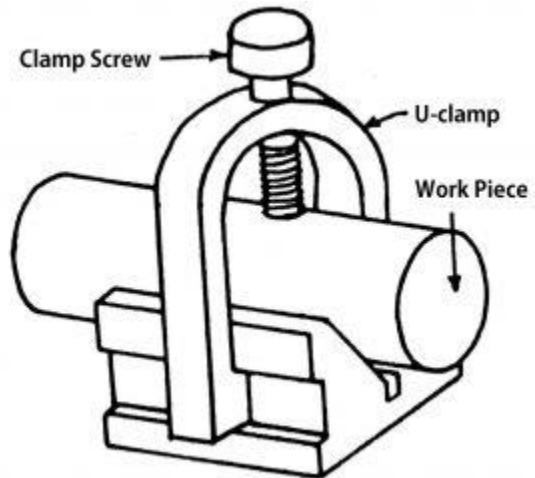
5.5 SHAPER TOOL

The cutting tool used in a shaper is a single point cutting tool having rake clearance and other tool angles to a similar lathe tool.



5.6 – HOLDING JOB ON A V-block

V-blocks are used to hold cylindrical work piece over the table.



CHAPTER -6 (BROACHING)

1. INTRO:- Broaching is a process of removing metal by pushing a cutting tool called BROACH which have successively higher cutting edge in a fixed part. Each tooth removes a predetermined amount of material.

1.2 TYPES OF BROACHING:-Broaches used in industry can be classified into following ways-

1.2.1.1 According to method of operation-push, pull or stationary broaches.

1.2.1.2 According to types of operation-internal and external broaches.

1.2.1.3 According to shape-solid, inserted, tooth, built up or replace cabal.

1.2.1.4 According to function- roughing, finishing, keyway, burnishing , sizing and serrating.

1.3 ELEMENTS AND NOMECLAURE OF A BROACHES:- A broaching tool or broach is an elongated tool provided with a series of multiple teeth positioned in tandem in an arrangement, where by each successive tooth is slightly higher than its predecessor.

1.3.1.1 PULL END:-The end of the pool broach which contain shank is called pull end.

1.3.1.2 FRONT PILOT:-The portion of broach which enters the hole before the teeth start cutting action is called front pilot.

1.3.1.3 REAR PILOT:-Its size and shape conform to those finished hole and provides support to the broach after the cutting process is over

1.3.1.4 ROUGHING AND SEMIFINISHING TEETH:-These teeth are used for removal of stock.

1.3.1.5 FINISHING TEETH:-These teeth are used for finishing the components.

1.3.1.6 LAND:-The upper portion of the teeth is called land.

1.3.1.7 PITCH:-The linear distance major between the cutting edge of the tooth and the corresponding point on the next tooth is called pitch.

1.3.1.8 CLEARENCE ANGLE:- This correspondence to the relief angle of single point cutting tool.

1.3.1.9 RAKE ANGLE:- It is also known as hook angle. It corresponds to the rake angle lathe tool.

1.3.1.10 DEPTH:- Depth is the vertical distance through which teeth are cut on broach blank.

1.4 TYPES OF BROACHING MACHINE:-

1.4.1.1 Direction of broach movement.

- Horizontal broaching machine
- Vertical broaching machine

1.4.1.2 Method of cutting

- Pull broaching machine
- Push broaching machine
- Continuous broaching machine

1.4.1.3 The surface to be machined

- Internal broaching machine
- External broaching machine

1.4.1.4 Method of drive

- Hydraulic drive
- Electro mechanical drive
- Mechanical drive

CHAPTER -7 (JIGS AND FIXTURES)

7.1 JIG:- A jig may be defined as a device which holds and locates the work piece and guides and control the cutting tool relative to the work piece.

7.2 FIXTURE:- A fixture is a work holding device which holds and positioned the work, but does not it in itself guide locate and position the cutting tool.\

7.3 ELEMENTS OF JIG/FIXTURE:- The following are the elements of jig/fixture

- Locating elements
- Clamping elements
- A rigid body into which the workpiece are loaded
- Tool guiding elements
- Elements for positioning

7.4 USES OF JIG/FIXTURE:-

- Laborious marking operation of components is eliminated
- Greater machining accuracy is obtained
- Productivity increases
- Semi skilled labour may be employed
- The machine tool is full or partially automated

7.5 PRINCIPAL OF JIG/FIXTURE DESIGN:- The design of jig and fixture is based on a number of fundamental principles which must be understood properly before commencing actual design.

7.6 CLAMPING DEVICES:- Any devices used for clamping a work in a jig/fixture is known as clamping device of jig/fixture.

7.7 DRILLING JIG:- A drilling jig is used for drilling holes in a large number of components on an interchangeable basis. In practice, a large variety of drilling jig are used.

CHAPTER-8 (CUTTING FLUIDS)

8.1 CUTTING FLUID:- Any substance applied to a tool during a cutting operation to facilitate the removal of chips and increase tool life is known as cutting fluid.

8.2 FUNCTION OF CUTTING FLUID:- The main functions of the cutting fluid are as follows:

- To reduce cutting forces
- To decrease wear and tear of the tool
- To provide lubrication effect to the tool
- To improve surface finish and machinability

8.3 PROPERTIES OF CUTTING FLUID:- There are the following properties of cutting fluid:

- It should be chemically stable
- It should have a high flash point
- It should cause no skin irritation
- It should be low price and economical in cost
- It should prevent the electrochemical effect of corrosion

8.4 TYPES OF CUTTING FLUID :- There are main types of cutting fluid given below –

- Neat cutting oils
- Soluble oils
- Synthetic fluids
- Semi synthetic fluids
- Mineral cutting oil
- Chemical additive oils
- Sulphurised mineral oil
- Chemical compounds

8.5 CHARACTERISTICS OF A GOOD LUBRICANT :-

- **VISCOSITY:-** Viscosity is the property of a lubricant by virtue of which it offers resistance to the movement of one layer of lubricant over an adjacent layer.

- **VISCOSITY INDEX:-** The viscosity of a lubricating oil changes considerable with temperature.
- **FLASH AND FIRE POINT:-** Flash point of a lubricating oil is the lowest temperature at which it gives sufficient vapours as to form an inflammable mixture with air and vapours gives rise to a momentary flash upon the application of test flame. Fire point is the lowest temperature at which the lubricating oil must be heated to burn continuously when a test flame is applied to it.
- **POUR POINT :-**It is the temperature below which the lubricating oil can not be used as a lubricant.
- **OILINESS:-** The oiliness of a lubricant may be defined as the capacity of an oil to maintain a continuous film under high pressure and speed.