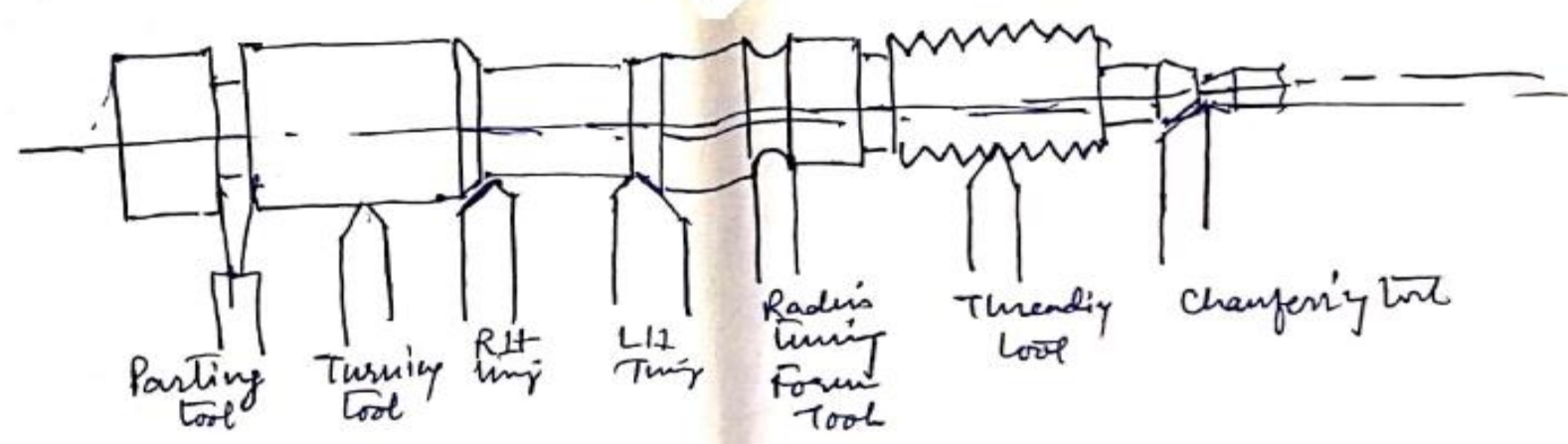


Metal Machining UNIT 7

Lathe is the oldest machine tool and also known as mother of the machine. All possible all metal removal operations are performed on the machine.

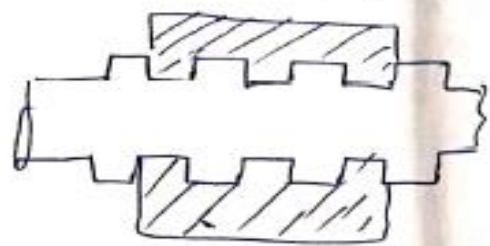
The types of lathe machine are

- Centre lathe - Bench lathe
- Tool Room lathe - Tool making.
- Special purpose lathe - copying lathe, Gap bed lathe,
- Hollow Spindle lathe.
- Capstan and Turret lathe
- Automatic lathe



op^h: 1) Facing, 2) Centering, 3) Turning, 4) Taper turning
 5) Drilling, 6) Reaming, 7) Boring, 8) Chamfering, 9)
 Threading, 10) Knurling etc

Components ∴ 1) Lead screw - To convert rotary motion
 into linear motion through lead screw



Guideways: Guideways or slideways are linear bearings
 for translatory movement b/w two members of a m/c tool
 such as carriage and bed is a lathe. They provide
 + alignment and fit + Ample load carrying capacity +
 adjustment of wear & lubrication

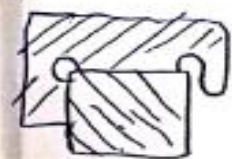
Types of slideways



V-Slide



Round

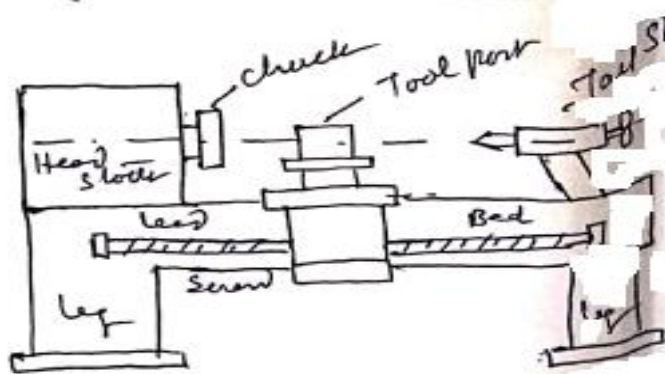


Flat



Dovetail

Basic of lathe machine



The various components that are present in all the machine tools may be identified as follows.

- Work holding device - To hold work piece in correct orientation to achieve accuracy in mfg. i.e. chuck

- Tool holding device to hold tool in the correct position & respect to work piece and provide enough holding force to counteract the cutting force acting on cutting tool. i.e. tool post
- Work motion mechanism - To provide the necessary motion to the work piece for generating the required surface. ex. head stock.
- Tool motion mechanism: To provide various motion as per req. to the tool in connection with work piece to generate accurate and required surface ex. carriage.
- Support structure: To support all the mechanism and maintain their relative positions & respect to each other and allow for relative movement b/w the various parts to obtain required part profile and accuracy. ex. bed.

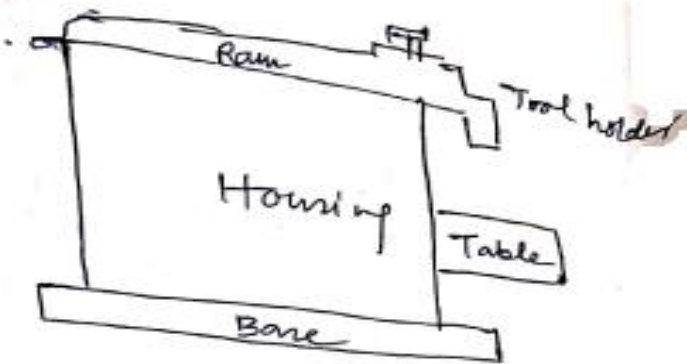
The various motions that need to be provided in the machine and machine tool and the function it is expected to serve. In this are cutting speed and feed. The range of speed and feed rates to be provided is given only tool depend on the capability of the m/c tool and the range of work materials that are expected to be processed. Basically the actual speed and feed chosen depends on -

- work material
- Required prodⁿ rate
- required surface finish
- expected accuracy

The drive unit in a machine tool are expected to provide the required speed and convert the rotational speed into linear motion.

- Chuck - Three jaw, Four jaw, magnetic chuck
- Bed - Dovetail & CI beds are made

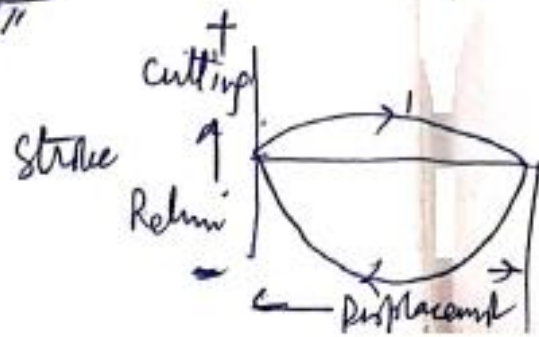
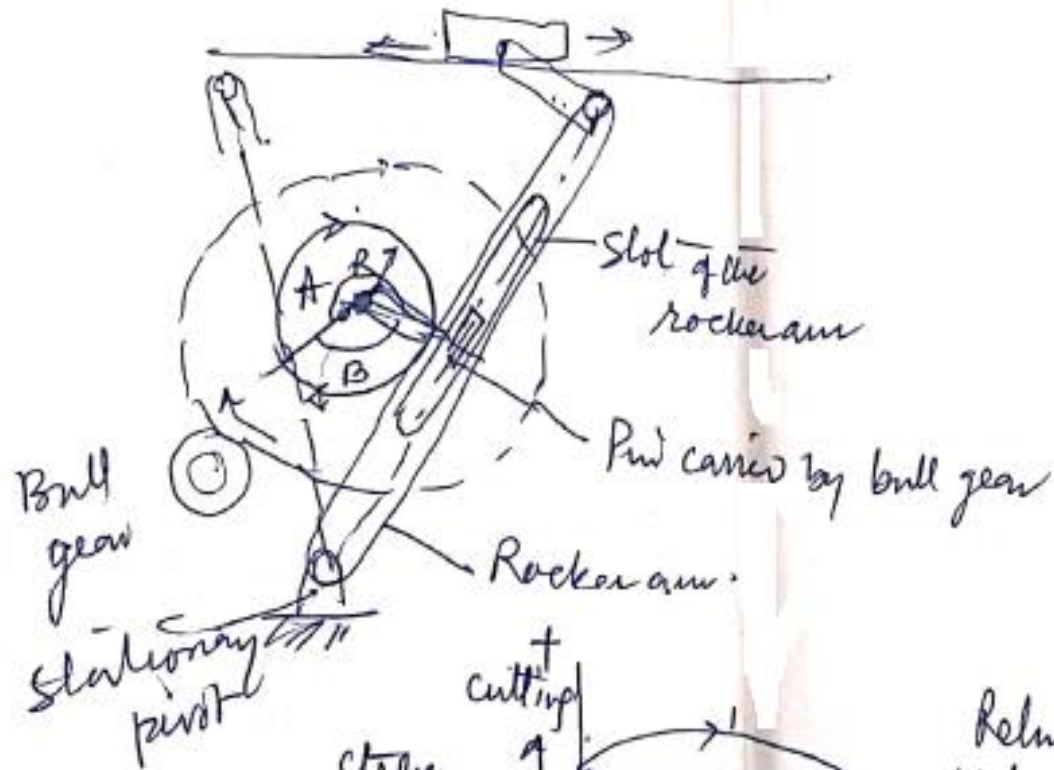
operation of Lathe :- Various operations are performed on lathe machines



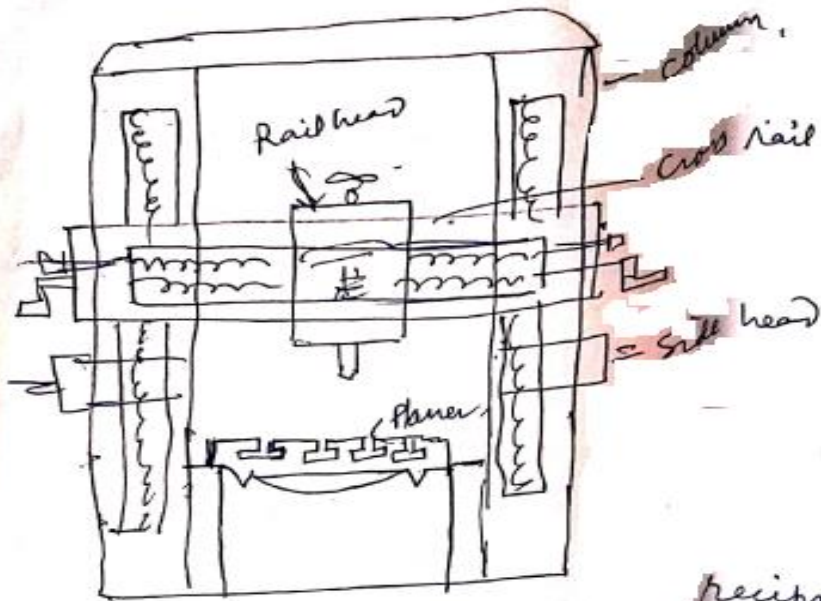
Shaper is a machine tool which only have the reciprocating motion and is quite slow in operation hence, replaced by more versatile milling machine. But the cost of the shaper is low hence the blank. hence it is rare.

preliminary rough machining of by used in production operations

Single point tool is used which clamped to a tool post mounted to a clapper box, which is link mounted to reciprocate ram. The ram while undertaking the cutting stroke, pushes the cutting tool through the WP to remove the material, when the ram returns, no cutting takes place. In slow return and cutting stroke the table moves in horizontal direction \perp to the cutting direction which termed as the feed direction. During the return stroke tool is lifted so that wear & bearing of the tool is reduced.



Return stroke has a higher velocity compared to cutting stroke.

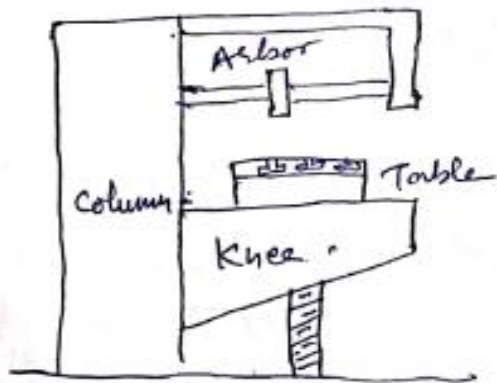


Planing machine is similar to shaper in terms of the surface that can be generated, Genl a planer is used for machining large W/P which cannot be held in the shaper as the shaper cutting tool reciprocates during the cutting motion while in planer, the W/P

reciprocates. Feeding motion is cutting tool, which remains stationary during the cutting motion.

A planer in which tool head in construction is similar to chatter box of shaper and is mounted on cross rail, the tool head can be moved along the cross rail for the feeding action while the depth of cut can be controlled by moving the tool downward, it is possible to mount more than one tool head on the cross rail as well as the column on both sides, so that multiple surfaces can be completed simultaneously. This helps in reducing lead time since planing is a relatively slow operation like shaper.

Milling Machine:



Milling machine is most widely used after lathe machine. In milling machine the work piece is fed into a rotating milling cutter which is a multi-point tool unlike a lathe which uses a single point cutting tool. The tool used in milling is called milling cutter.

This is one of the most versatile machine tools. It is adaptable for quantity production as well as in job shops and tool rooms.

- Accuracy expected from the process is about ± 0.050 mm.
- Types of Milling m/c:
- ④ Knee and Column type - Horizontal, Vertical universal
 - Milling cutters - Based on variety of methods
 - Solid (constructions) inserted tooth type
 - Mounting

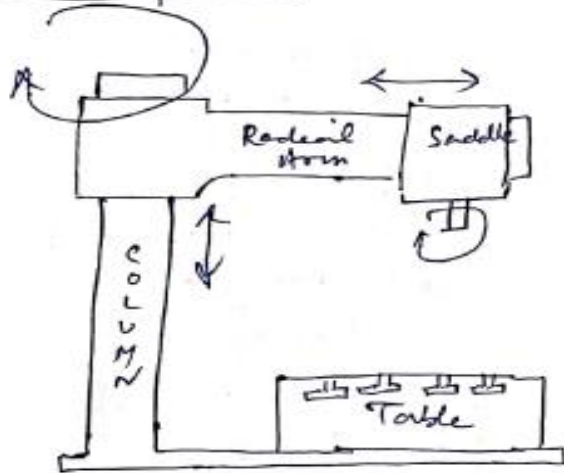
- Mounting
Arbor mounted, Shank mounted
- based on Rotation. R-H rotation, L-H rotation

Side face milling cutter, slotting saw; ~~and~~ End mill

UP Milling In up milling the cutting tool rotates in the opposite direction to the table movement. In the up milling or Conventional the chip starts as zero thickness and gradually increases

Down milling! In down milling the cutting tool rotates in the same direction as of the direction of motion of the table, table is to be tightly fastened and because cutting force may take the slide away from the table. because from the beginning chips are of full size.

Drilling M/C



Radial drilling M/C.

Machining round hole in a metal & stock is one of the most common operation in the mfg industry.

The type of hole-making operations made on these holes are:

- 1) Drilling
- 2) Boring
- 3) Reaming
- 4) Counter sinking
- 5) Counter boring and Tapping.



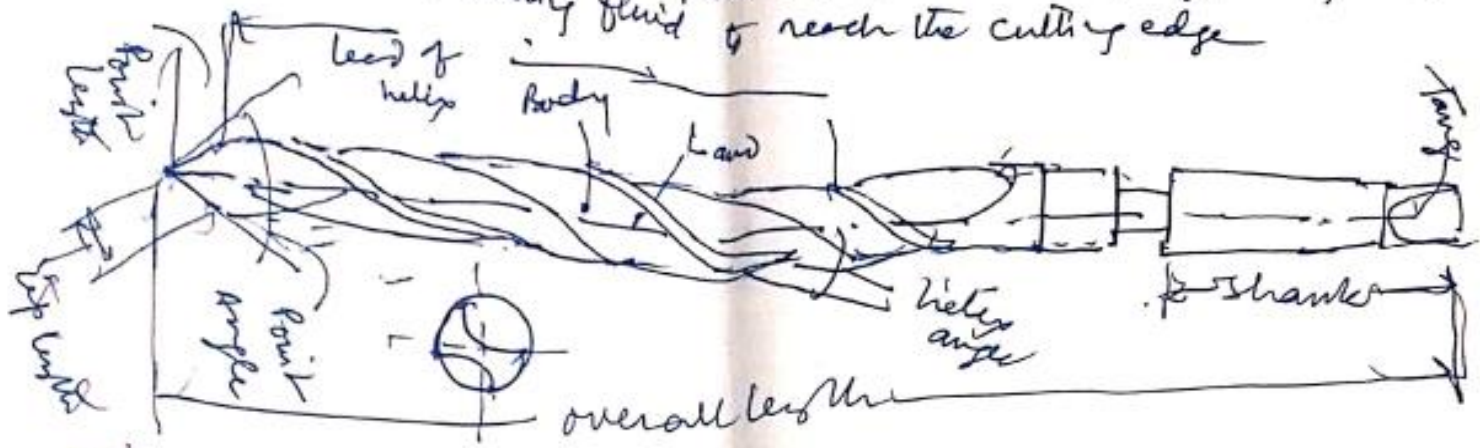
Through hole, Blind hole, Blind hole with flat bottom, Counter hole, Counter sink hole, Spot face, Step die.

Twist drill is used to drill in solid material, all the other operations are used to enlarge the hole or improve the quality of the hole depending upon the requirements.

Twist Drill Geometries

Twist Drill Geometry:

The cutting tool used for making holes in solid material is called the twist drill. It is basically consists of two parts; the body consisting of cutting edge and the shank which is used for holding purpose. It has two cutting edges and two opposite spiral flutes cut into its surface. These flutes serve to provide clearance to the chips produced at the cutting edge. They also provide/allow the cutting fluid to reach the cutting edge.



Types of Drills: oil hole drill, step drill, core drills, carbide tipped drill.

Drilling types: Pillow drill, Radial drill, Multiple spindle drills, Core drill.

Types of Drills: oil hole drill, tap drill, core drills, carbide tipped drill.

Drilling types: . Follow drill, Radial drill, Multiple spindle drilling, Gang drilling

Radial drill is the radial drilling machine is most versatile - to the drill press. The radial drilling machine, showing the principle parts and motion - The drill head can move along the radial arm to any position while the radial arm itself can rotate on the column, thus allowing for reaching any position in the radial range of the machine. The machine is more convenient for large work piece, which cannot be moved easily, because of the size & weight. In such cases the drill head itself is moved to the actual location on the work piece. In addition to one drill size other drills can also be used of various size one by one.

