

TURNING SECTION

Lathe is a machine tool which has practically given shape to our present day civilization by building machines and industries.

The main function of a lathe is to remove metal from a piece of work to give it the required shape and size. This is accomplished by holding the work securely and rigidly on the machine and then turning it against cutting tool, which will remove metal from the work in the form of chips.

The following are the principal parts of a lathe machine.

- i) Bed.
- ii) Carriage
- iii) Head stock
- iv) Feed mechanism.
- v) Tail stock
- vi) Screw cutting mechanism.

The operations which are performed on the lathe either by holding the workpiece between the centres or by chuck are as follows.

- i) Facing
- ii) Chamfering
- iii) Straight turning
- iv) Grooving
- v) Knurling

Operations which are performed by holding the work on chuck on a face plate or on angle plate are:

i) Drilling:

Drilling is the operation of producing a cylindrical hole in work piece by the rotating cutting edge of cutter, known as drill.

ii) Boring:

Boring is the operation of enlarging the turning hole produced by drilling, punching, casting or forging. Boring cannot regenerate the hole.

iii) Internal thread cutting:

The principle of cutting internal threads is similar to that of an external thread. The only difference is the tool used. The tool is similar to a boring tool with cutting edges ground to the shape conforming to the type of the thread to be cut.

Tailstock:

The tailstock is a tool holder directly mounted on the spindle axis, opposite the headstock. The spindle doesn't rotate but does travel longitudinally under the action of lead screws and hand wheel. The spindle includes a taper to hold the drill bits, centers and other tooling. The tailstock can be positioned along the bed and clamped, in position as required.

AIM: To perform operations like facing, turning, drilling, boring and internal thread cutting on a given solid cylindrical metal of dimensions $(35 \times 43\phi)$ mm and give the required shape.

Equipments required:

- (i) Chuck key
- (ii) Marking block
- (iii) Vernier calliper
- (iv) Packings
- (v) Tod post spanner.
- (vi) Cutting tool
- (vii) Brush
- (viii) 25mm twist taper shank drill bit.
- (ix) Boring tool.
- (x) Internal thread cutting tool.

Procedure:

- i) The work piece is fixed in the chuck with the help of chuck key and marking block
- ii) After this facing operation is done
- iii) Drill of 25mm diameter is marked with the help of twist taper shank drill bit.
- iv) Now the boring operation was done to enlarge the hole.
- v) Then internal threading operation was done with the help of internal thread cutting tool.
- vi) Finally chamfering operation was done on both sides with the help of cutting tool.

Precautions:

- i) Apron and leather shoes should be worn
- ii) Proper distance between the body and the machine should be maintained.
- iii) Safety goggles should be worn in all operations to prevent damage to the eyes from hot chips of metal produced during the operations.

Conclusion:

A ~~eyed~~ cylindrical job of required dimensions (35 x 434) has been prepared.

SHAPING MACHINE:

Shaping machine is a form of plane surface machine tool in which is kept stationary while the tool moves backward and forward, cutting on the slower forward stroke and lifting practically clear on the faster return stroke.

It is a basic equipment of every mechanical workshop and are required in both the repair sector and construction and production sector. The shaping machine is more suitable for machining surface of relatively narrow width on smaller surfaces. It is also used for shaping keyways and irregular sections.

In the actual design, the tool can be adjusted vertically. The tool box is carried on a slide that can be moved up and down a V-type slide by means of screw and nut arrangement. The table may also be adjusted vertically and sideways in the horizontal sense. There is also an arrangement for giving the horizontal hand on automatic feed.

Types of shapers:

Shapers are classified in a number of ways based on general features of design or purpose for which they are intended. Shapers are classified as under.

- 1) According to the type of mechanism used for giving reciprocating motion to the ram.
 - a) Crank type. (b) Cranked type. (c) Hydraulic type.

- 2) According to the position and travel of cutter.
 - a) Horizontal type
 - b) Vertical type
 - c) Travelling head type.
- 3) According to the type of design of table.
 - a) Standard shaper
 - b) Universal shaper
- 4) According to the type of cutting stroke.
 - (a) Push type.
 - (b) Draw type.

Working Principle:

The stroke of the cutting tool is made variable in order to deal with different widths of work. The usual arrangement of shaper mechanism is as shown in the figure. In this case, the ram, which consists of a dove-tailed sliding unit and R carrying at one end and cutting tool T, derives its reciprocating motion from a swinging arm AB through the medium of a pin C, which is rotated about the center E of a revolving disc. The slotted arm AD has a fixed bearing at D and a pin bearing at A. The pin C of the disc works in a rectangular block which can slide in the slot of the arm AB. The arm AB is shown at the extreme left hand side of its travel. The extreme right hand position is indicated by dotted position B.

Parts of shaping machine :

Base : The base is the necessary bed or support required for all machine tools. The base may be rigidly bolted to the bench according to the size of the machine.

Column : The column is a box like casting mounted upon the base. It encloses the main driving mechanism. Two accurately machined guide ways are provided on the columns on which the ram reciprocates.

Cross rails : The cross rails is mounted on the front vertical guide ways of its column. It has two parallel guide ways on its top on the vertical plane that are perpendicular to the ram axis.

Saddle : It is mounted on cross rail which holds the table firmly on its top.

Table : The table which is bolted to the saddle receives crosswise & vertical movements from the saddle and cross rail.

Ram : It is the reciprocating member of the shaper. This is semi-cylindrical in form and heavily ribbed inside to make it more rigid.

Tool head : It holds the tool rigidly, provides vertical and angular feed movement of tool and allows the tool to have an automatic relief during return stroke.