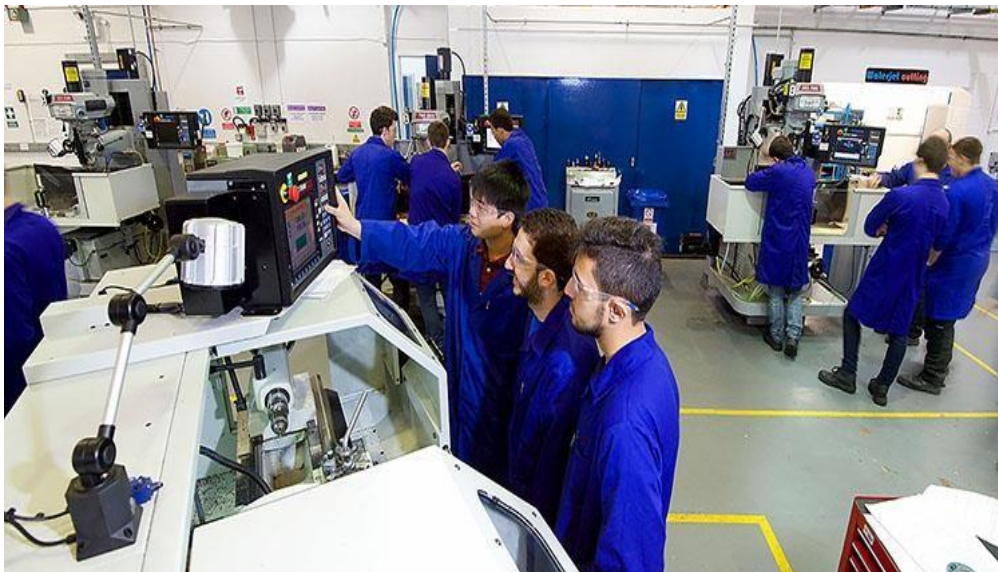




WORKSHOP

LATHE MACHINE



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.

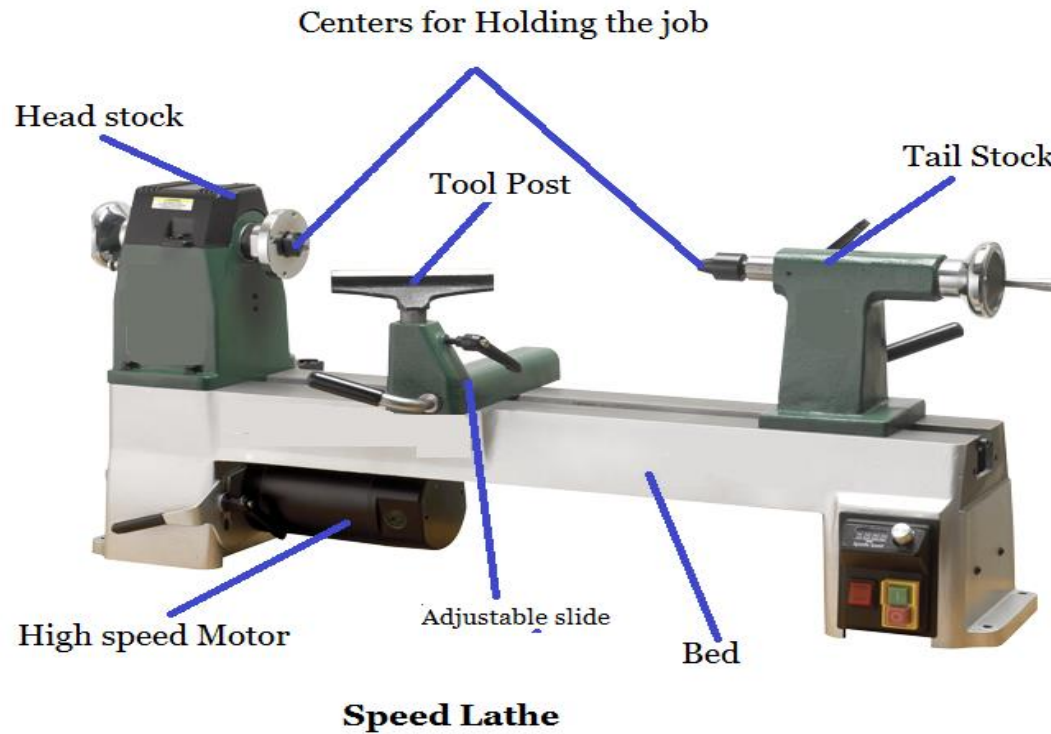
WORKING PRINCIPLE: In lathe machine the work piece is attached to chuck via jaws which rotates by obtaining its power from motor through arrangement of gear train, belt drive and pulley. The cutting tools attached to tool post move relative to work piece to performed different operation in lathe.

Type of LATHE :

1. Speed Lathe
2. Engine Lathe
3. Bench Lathe
4. Production Lathe (automatic , capstan and turret)
5. CNC Lathe

1.

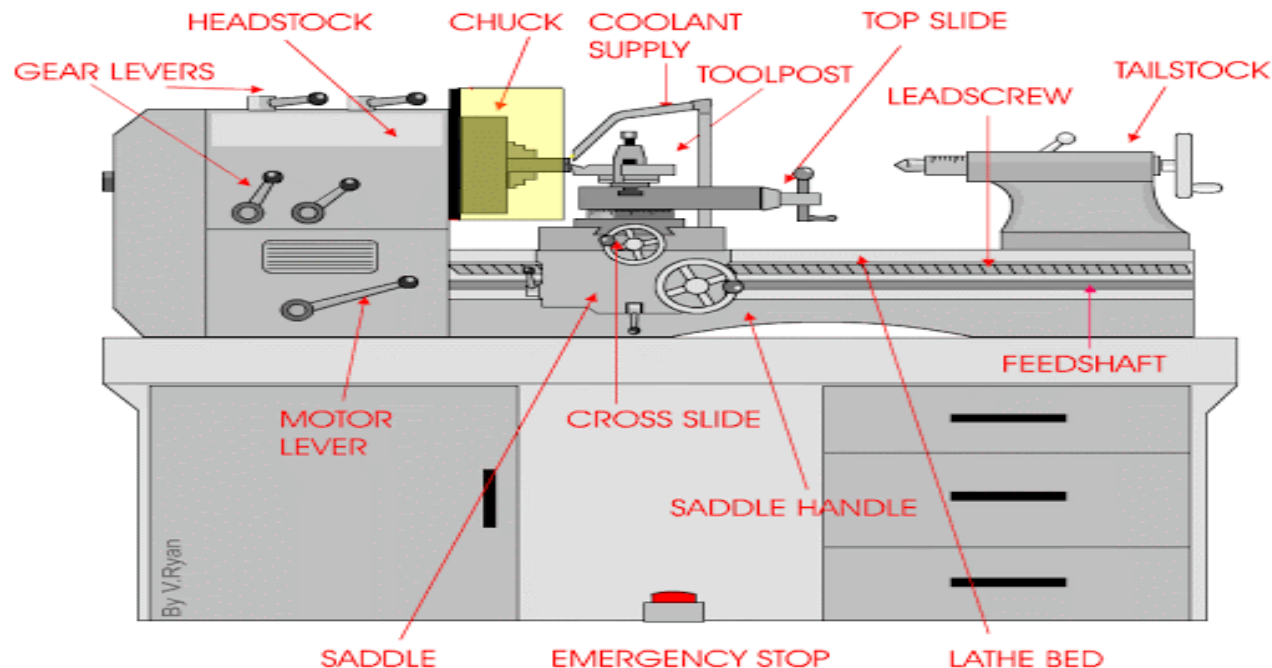
- It was the initial lathe developed that has no lead screw, no carriage and the tool is mounted on the adjustable slide.
- Only 2/3 speeds are available for use.
- Speed range 1200 – 3600rpm.



Speed Lathe

2. Engine or Center Lathe :

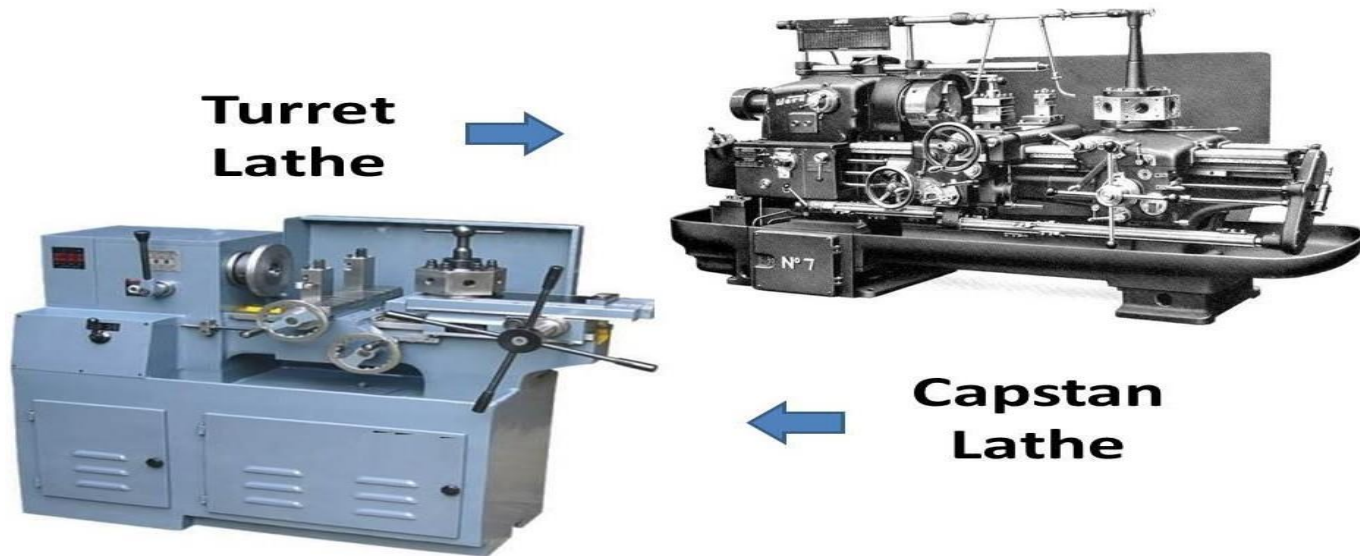
- It is a modern lathe and there is a lead screw on which carriage is mounted.
- Feed is given by the movement of carriage.
- Over the carriage, there is cross slide and over cross slide, there is tool post.
- Tool is mounted on the tool post and by the movement of cross slide we give depth of cut.



3. **Bench lathe** is a small lathe that is mounted on a work bench. It is used for small work pieces having a maximum swing of 250 mm at the face plate. Lathes of this type are used for precision work on small parts for instrument making.



4. Production lathes are machines designed to produce large number of duplicate parts faster and with less skill. They employ faster work holding devices and may have two or more tools operating simultaneously. The supervision is simplified and much less skill is needed except for setting the machine. These machines may also be made partially or fully automatic with the operator being needed only for loading the bar stock and removing the finished work pieces. Depending upon the complexity, production lathes may be divided into **automatic lathes, capstan and turret lathes**.



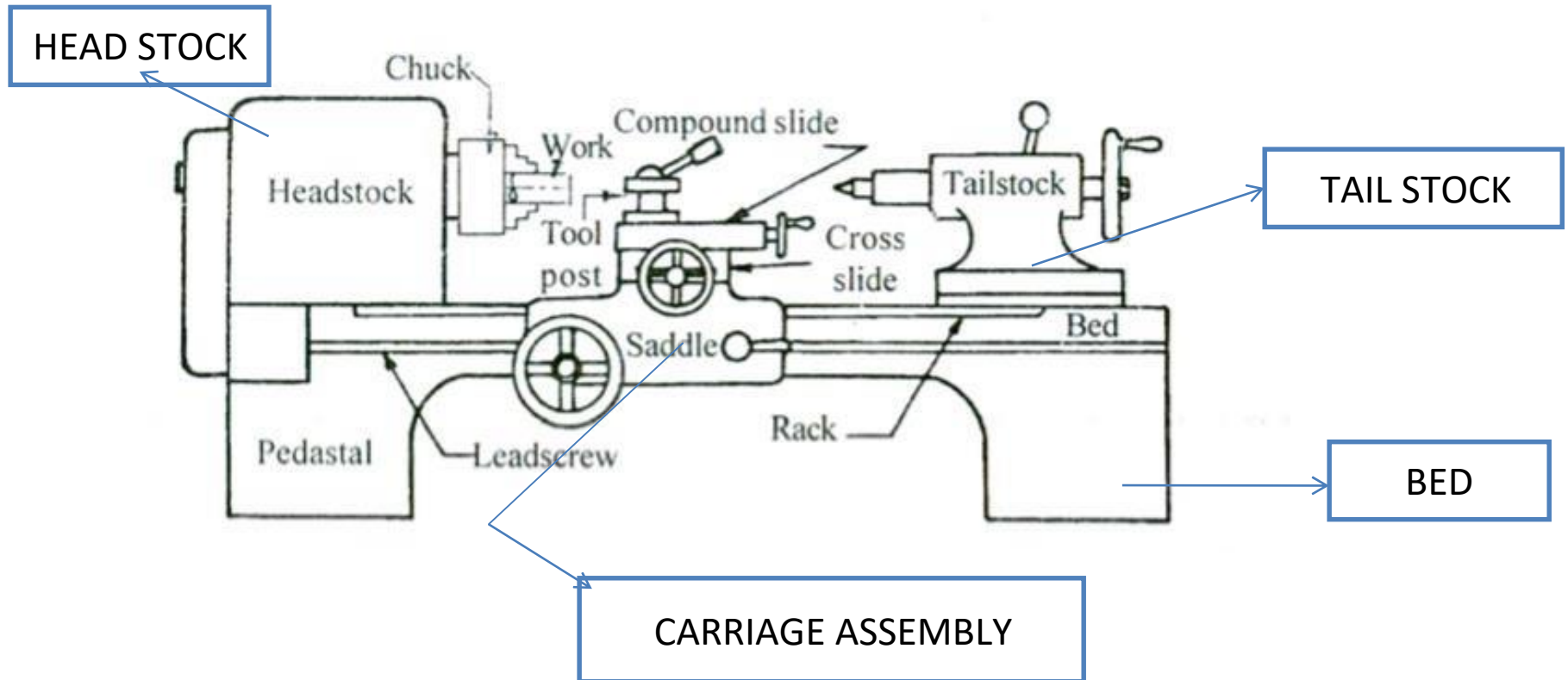
5. **Computer numerical control (CNC)** has been incorporated into a variety of new technologies and machinery. One such machine of this sort that is used for a wide array of production processes is known as a **CNC lathe**. A **CNC lathe** is typically designed to utilize modern versions of tooling and processes. A part can be designed for customization, and the machine's tool paths are often programmed using the CAD or CAM processes. However, a programmer can **manually design a part or tool path as well**. The resulting coded computer file is then uploaded to the CNC machine, and the machine will then automatically produce the desired parts for which it was programmed to design.



CONSTRUCTION OF LATHE :

A **LATHE machine** essentially consists of the following major units:

1. Bed
2. Head Stock
3. Tail Stock
4. Carriage Assembly.



1. **The bed of lathe** forms the base of the machine. It is supported on two legs at a convenient height. It carries the head stock and the tail stock for supporting the work and provides a base for the movement of the carriage assembly which carries the Tool. It is made of cast iron as it has high compressive strength and damping property.

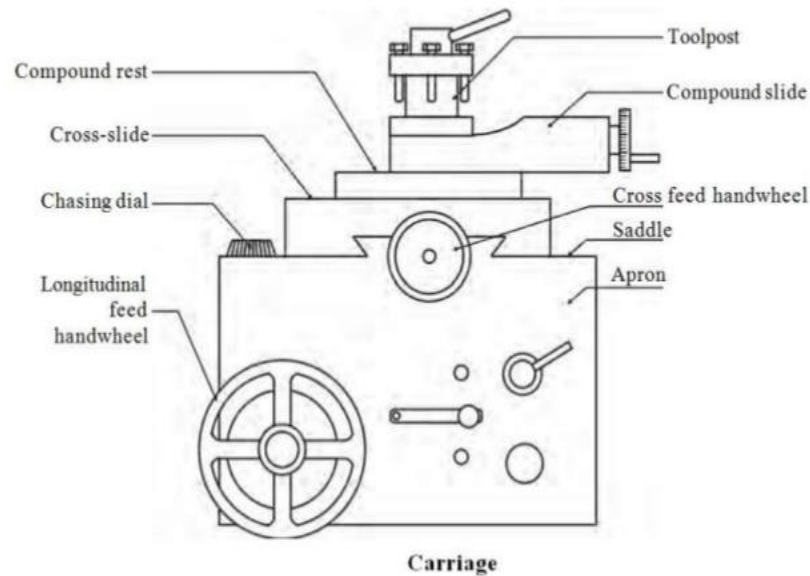
2. **The head stock** is rigidly fixed on the bed. It consists of rotating chuck where work piece are attached rigidly. The power is supplied to head stock by belt drive through pulley which obtains its power by electric motor.

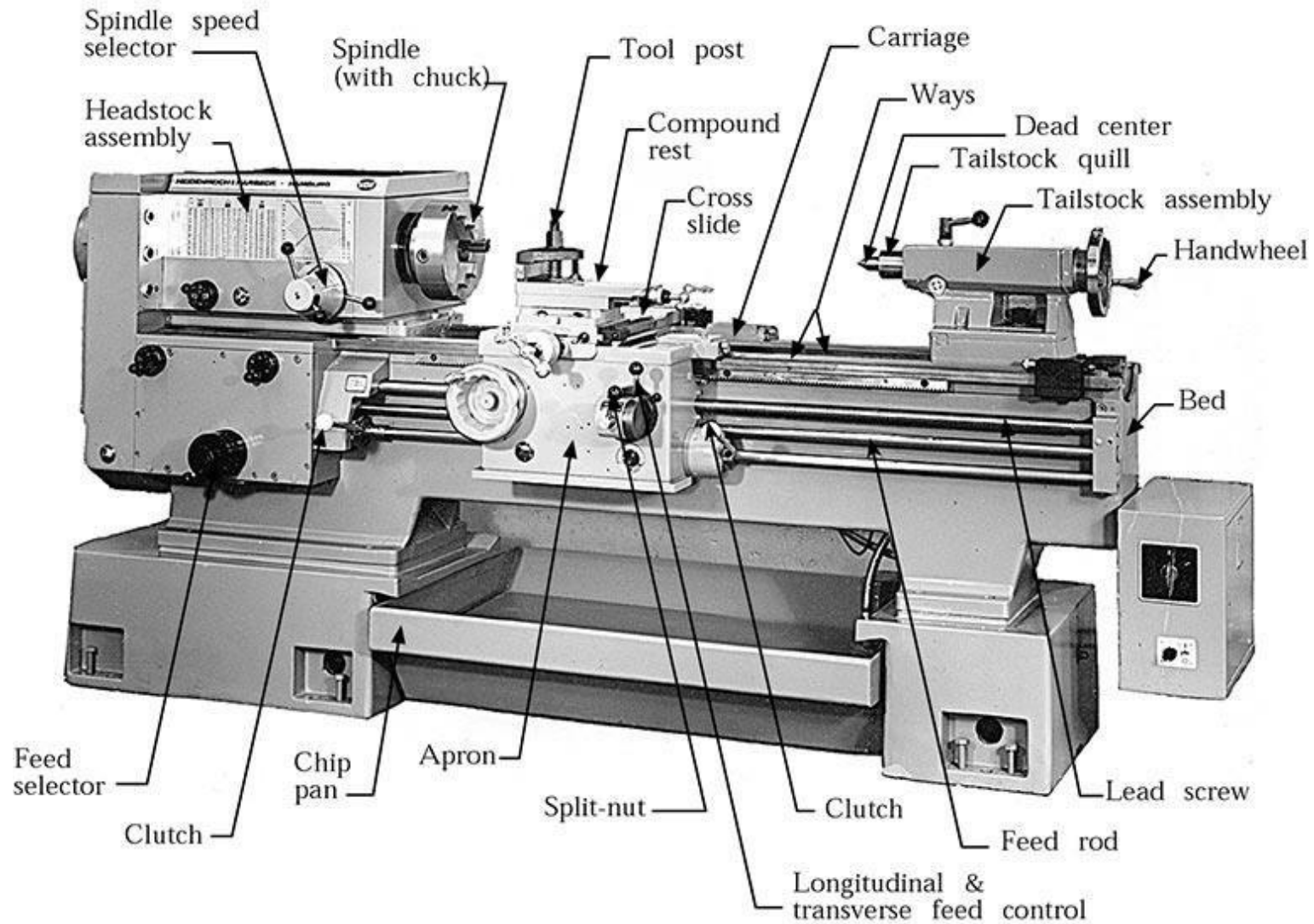
3. **The tail stock** is for the purpose of primarily giving an outer bearing, support for work being turned on centres. It can be adjusted for alignment or non-alignment with respect to the spindle centre and carries a centre called dead centre for supporting one end of the work.

4. **The carriage assembly of lathe** comprises of a number of components which support, move and control the tool. The carriage assembly consists of **a saddle, cross slide, compound rest, tool post and apron.**

- The Carriage is the part of the lathe which slides over the bed ways between the headstock and tailstock.
- Saddle helps cross slide to move back and forth on the machine.

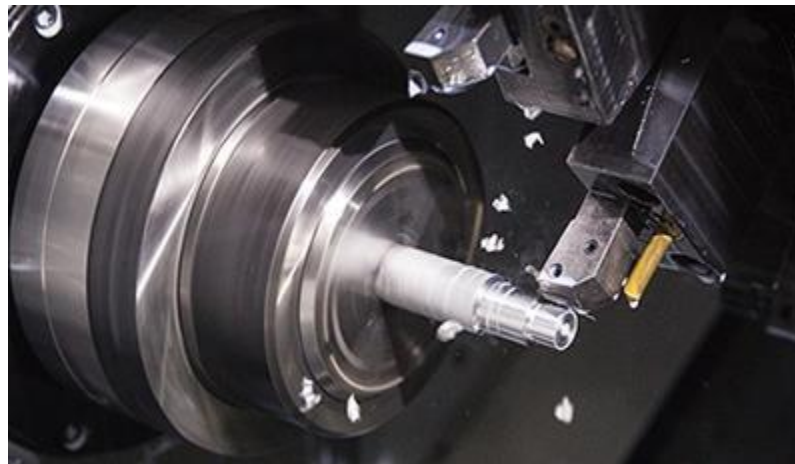
- Cross Slide is mounted on the saddle. Its function is to provide cross feed of the tool and its movement is perpendicular to the center of lathe machine.
- Compound Rest is set up over the cross slide and it can move in a circular path.
- Tool Post is situated at the top of the Carriage. It is used to hold the tool.
- Apron is used to control movement of carriage on bed.





- **Operations commonly performed on a lathe:**

1. **Turning** is the operation in which a cylindrical surface is produced. It is the process in which diameter of cylinder workpiece surface is decrease by rotating it and tools moves relative to it. The tool is first given a depth of cut by using the cross slide motion of the carriage and then given an axial feed by hand or power.



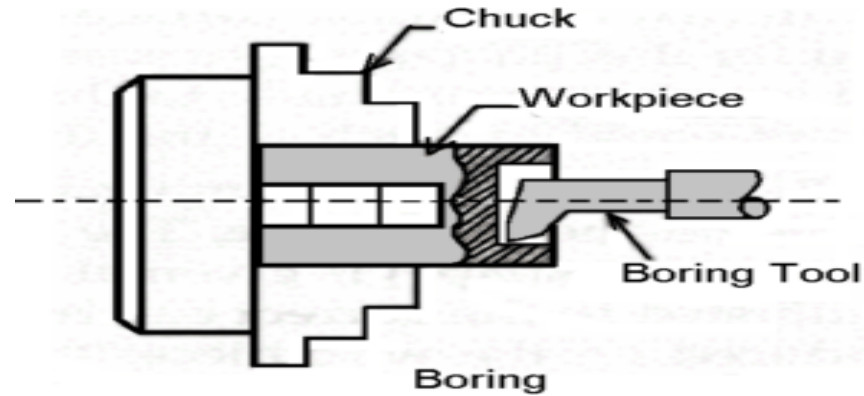
2. **Facing** is an operation used to produce a flat surface at right angles to the rotational axis of the job. In this case tool is fed at right angles to the job while the depth of cut is provided by the axial motion of the carriage. The job may be held in a chuck or between centres. This operation is used to decrease the length of workpiece.



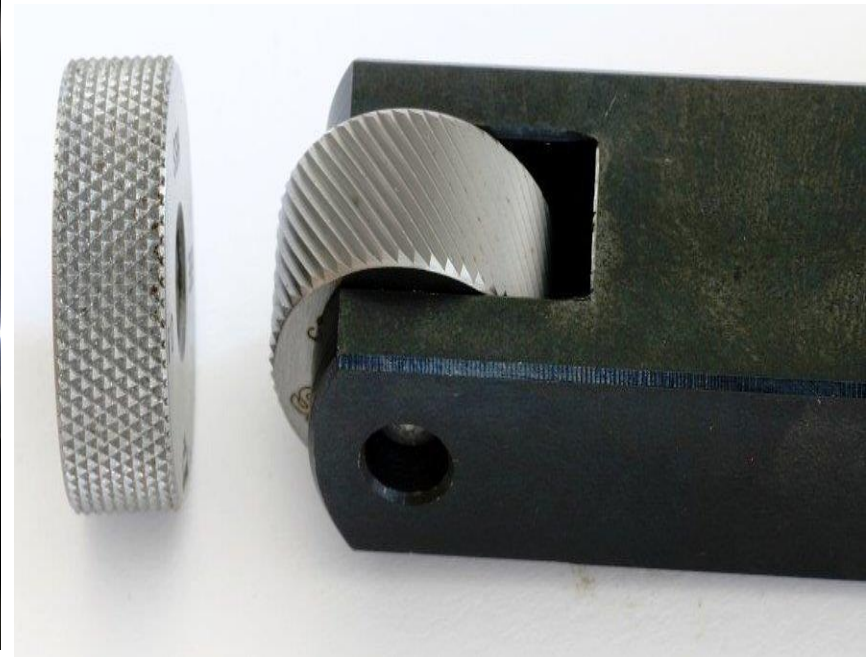
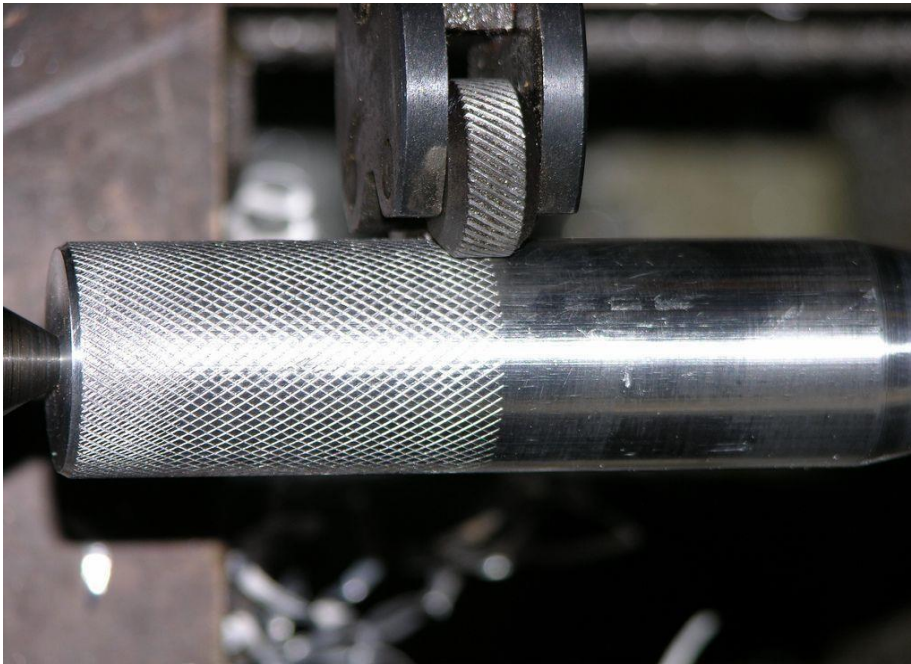
3. **Drilling** : The work piece is held in a chuck and the drill is held in the tail stock quill. The taper in the quill ensures that the axis of the drill is concentric with the rotational axis of the spindle. Feeding is done by movement of the tail stock quill.



4. **Boring** is the process of enlarging a hole produced by drilling, casting, punching or forging with the help of a single point cutting tool. Boring can not originate a hole. In boring the job is held in a chuck and a boring tool held on the tool post are fed into it. Boring produces an internal cylindrical shape from an existing hole. It is used to increase the inside diameter of a hole.



5. **Knurling** is the process of embossing a diamond shaped pattern on the cylindrical surface of a work piece. Knurling is done on the work piece so that it does not slip when held and operated by hand. The work piece is supported in the chuck but since quite heavy forces are involved in the knurling process an additional support is generally provided at the free end with the tail stock centre. Knurling is done with two serrated hardened steel rollers pressing into the work piece.



6. Thread cutting on the lathe is a process that produces a helical ridge of uniform section on the work piece. This is performed by taking successive cuts with a threading tool bit the same shape as the thread form required.

