

# LATHE

## Definition

Lathe is a machine, which removes the metal from a piece of work to the required shape and size

## Common types of lathes:

### Engine Lathe:

The most common form of lathe, motor driven and comes in large variety of sizes and shapes.

### Bench Lathe:

A bench top model usually of low power used to make precision machine small work pieces.

### Tracer Lathe:

A lathe that has the ability to follow a template to copy a shape or contour.

### Automatic Lathe:

The lathe in which the work piece is automatically fed and removed without use of an operator. operations are automatically controlled by a sequencer of some form.

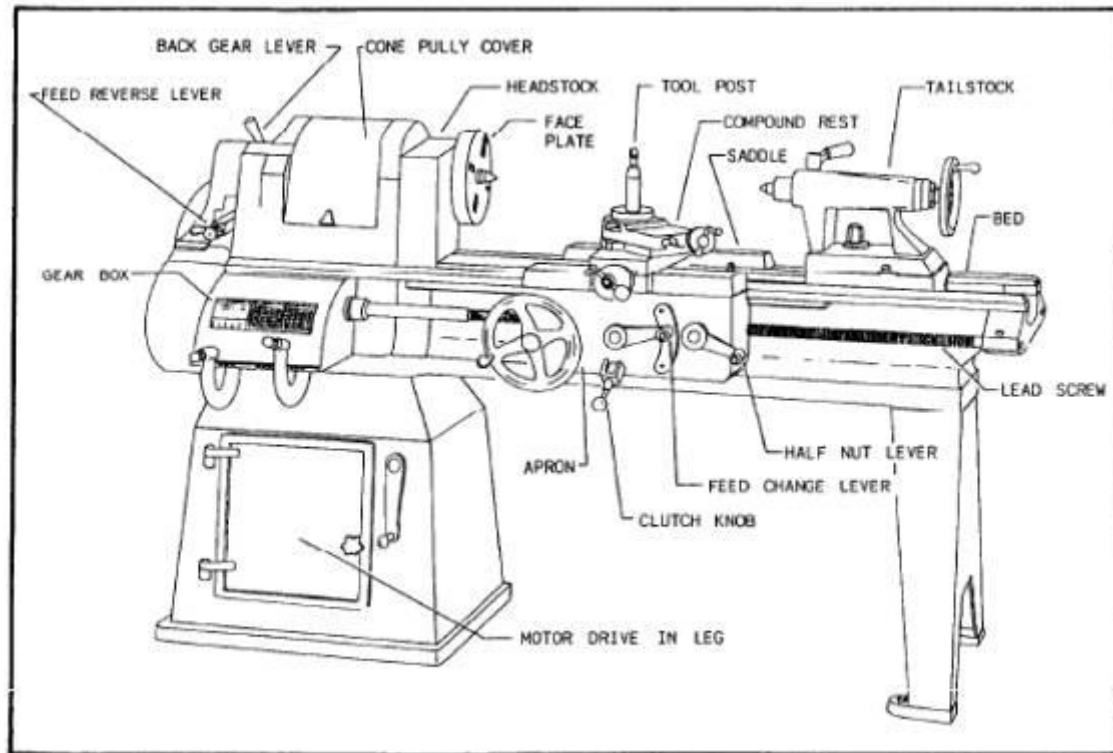
### Turret Lathe:

The lathes which have multiple tools mounted on turret either attached to the tailstock or the cross-slide, which allows for quick changes in tooling and cutting operations.

### Computer Controlled Lathe:

Highly automated lathes, where cutting, loading, tool changing, and part unloading are automatically controlled by computer coding.

The figure (1) shows **Photographic view of Engine Lathe**



**Fig (1) Engine Lathe**

**Centre lathe – constructional features**

- Head stock
- Tail stock
- Bed
- Carriage
- Feed rod
- Lead screw
- Feed change gear box

**Lathe specifications**

- Distance between centers
- Swing over the bed
- Swing over the cross slide
- Horse power of the motor
- Number of speeds
- Number of feeds

**Lathes and Lathe Operations**

- Lathes are the oldest machine tools
- Lathe Components

- Bed: supports all major components
- 
- Carriage: slides along the *ways* and consists of the *cross-slide, tool post, apron*
- Headstock – Holds the jaws for the work piece, supplies power to the jaws and has various drive Speeds
- Tailstock – supports the other end of the work piece
- Feed Rod and Lead Screw – Feed rod is powered by a set of gears from the headstock

## **LATHE BED**

- The bed is the base of the lathe and supports all the major components of lathe.
- Lathe bed material made of grey cast iron , to resist deflection and absorb vibrations during cutting

## **Carriage Feed**

- Longitudinal Feed or “Turning” - The tool is fed *along* the work.
- Cross Feed or “Facing” – The tool is fed *across* the work.

## **Tail Stock:**

It's like a stationary drill press

It is centered with your work piece

For drilling use a drill chuck that fits your bits

Jam the drill chuck into the tail stock

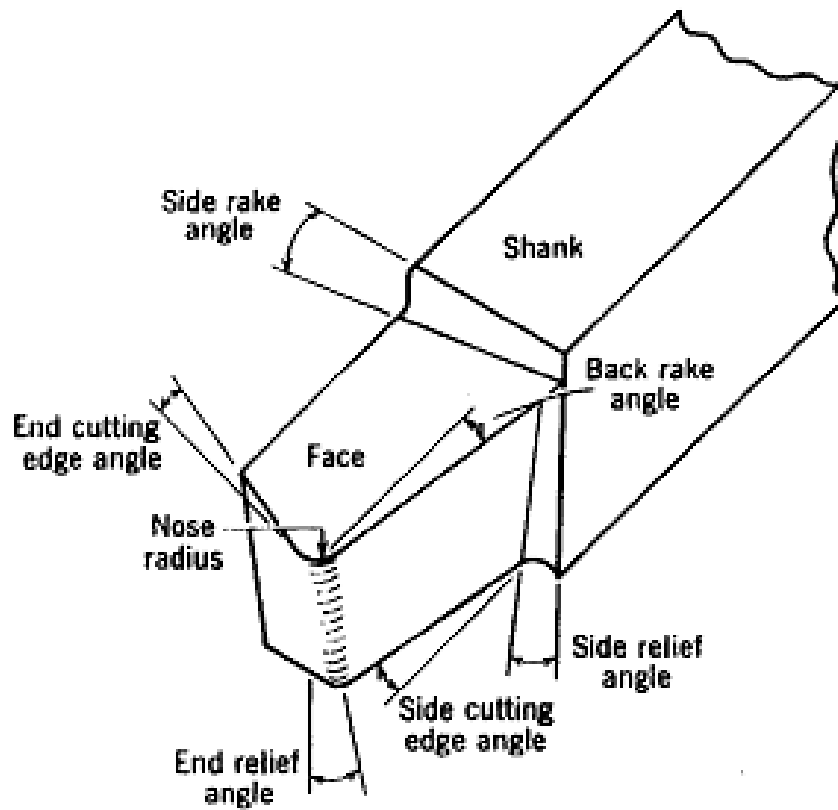
To remove the chuck turn the tail stock back to zero and the chuck should pop out

## **Cutting Tools**

There are basically two types of cutting tools:

- Single point (e.g. turning tools). ( fig .2 )
- Multiple point (e.g. milling tools).

Fig (2) shows single point cutting tool

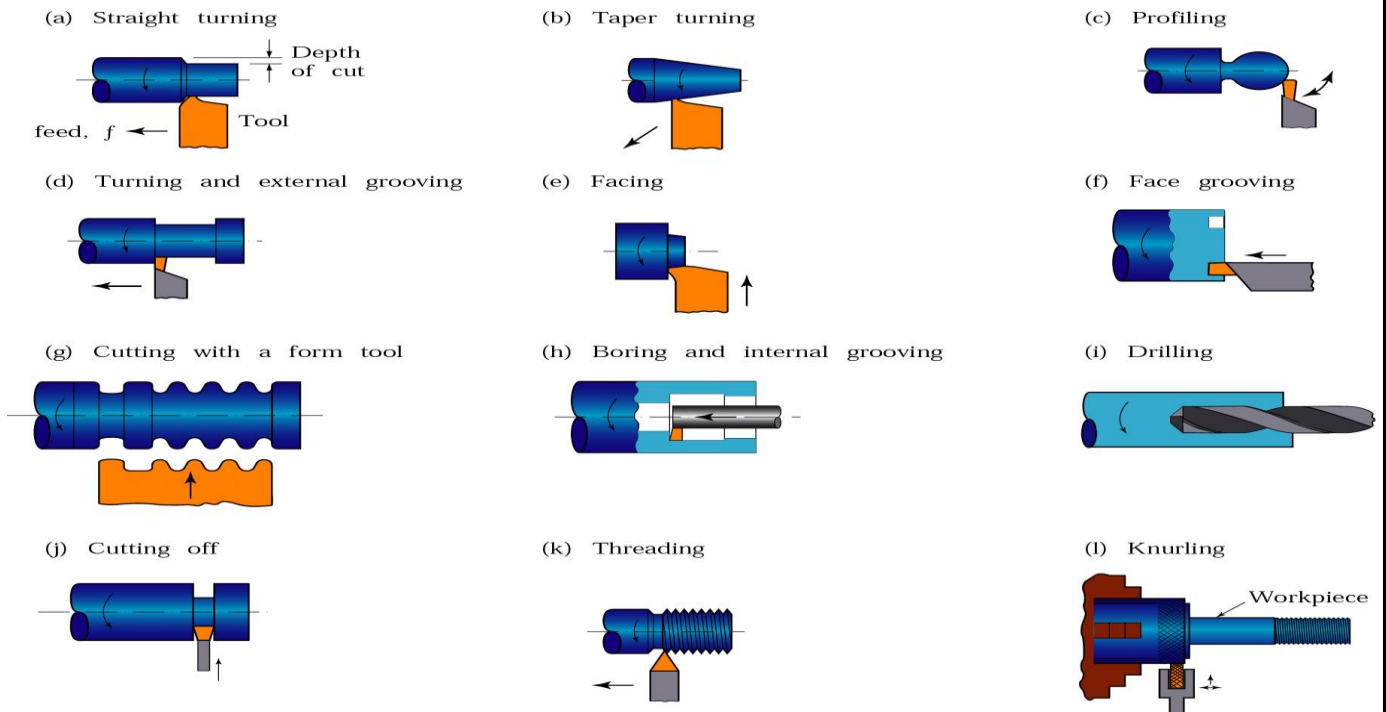


**Fig ( 2)**

Various lathe operations

- Turning – produces straight, conical, curved, or grooved work pieces
- Facing – produces a flat surface at the end of the part
- Boring – to enlarge a hole
- Drilling - to produce a hole
- Cutting off – to cut off a work piece
- Threading – to produce threads
- Knurling – produces a regularly shaped roughness

Fig (3) shows different types of lathe operations



**Fig (3) Types of Lathe operations**

### Work holding Devices for Lathes:

Many different devices, such as chucks, collets, faceplates, drive plates, mandrels, and lathe centers are used to hold and drive the work while it is being machined on a lathe.

### Work pieces can be held by various methods

- Work piece mounted between centers
- Work piece mounted within a single chuck
- Work piece mounted within a collet
- Work piece mounted on a faceplate

**Three Jaw chuck:** It usually has three jaws, the jaws are moved simultaneously within the chuck (fig.4).

**Four Jaw chuck:** This is independent chuck generally has four jaws , which are adjusted individually on the chuck face by means of adjusting screws(fig.5).

**Magnetic chuck:** Thin jobs can be held by means of magnetic chucks.

**Face plates:** The face plate is used for irregularly shaped work pieces that cannot be successfully held by chucks or mounted between centers (fig.6).

**Mandrels:** A work piece which cannot be held between centers because its axis has been drilled or bored and which is not suitable for holding in a chuck or against a faceplate is usually machined on a mandrel.

**Collet chuck :** Collet chuck is used to hold small work pieces.

3 JAW CHUCK

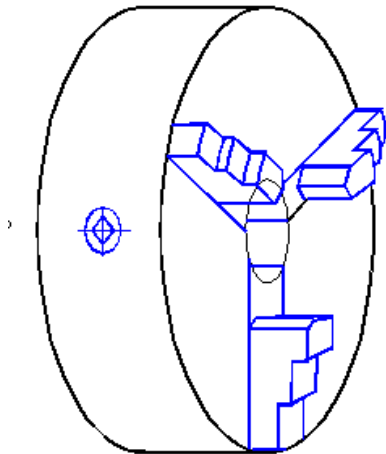


Fig.(4)

4 JAW CHUCK

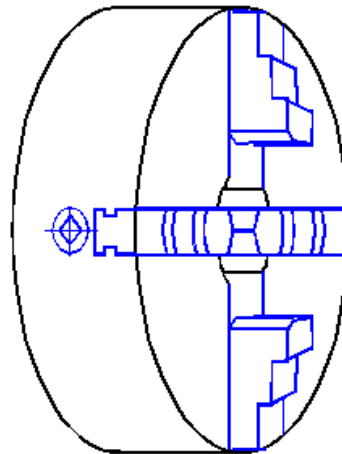


Fig.(5)

### **Taper Turning**

$\tan \alpha = (D_1 - D_2)/2L$  where  $\alpha$  = angle of taper

$D_1$  = major diameter in mm

$D_2$  = minor diameter in mm

$L$  = Length of taper in mm

The conicity  $K$  of the taper is defined as  $K = (D_1 - D_2)/L$