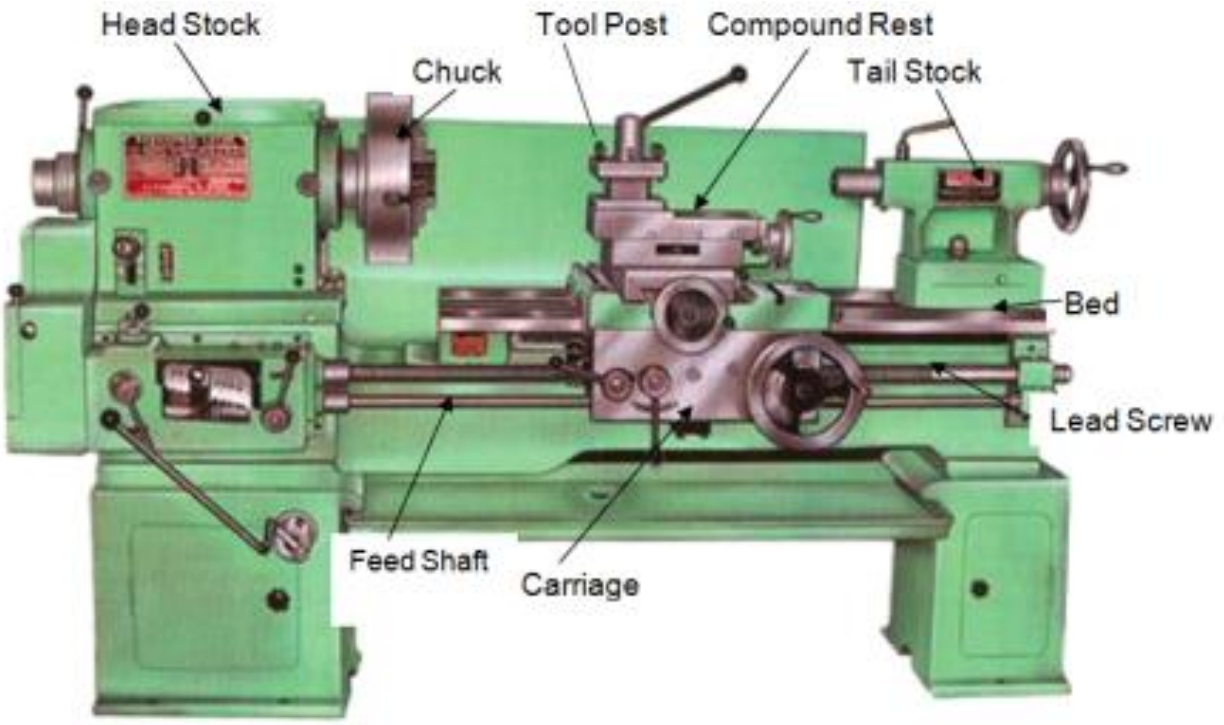
# MACHINE SHOP



## SAFETY PRECAUTION

1. Always wear proper fitting apron before starting work in machine shop. Do not wear loose clothes.

2. Always wear safety goggles to protect your eyes against any flying chips or dust.

3. Keep your hands away from the moving cutter or work piece.

4. Cover the pulleys & belts with safety guards while working.

5. Never let your clothes & hand come in contact with the revolving chuck, pulleys, belts, etc.

6. Work piece should be held tightly between the live & dead centers.

7. Don't touch the chips while the same are being generated by the machine because these are extremely hot.

8. Be sure that cutting tool is tightly held in tool post.

9. Do not touch the tool tip during grinding of the tool.

10. Don't give excessive feed to the cutting tool. It damages the tool tip & may even cause accident.

11. You must always know the position of fire extinguisher & first aid box in the shop.

## LIST OF PRACTICALS

**1.** To Study the working of Lat machine tools like Lathe machine, Shaper machine, Drilling machine, & grinding machine.

**2.** To perform the operations Facing, Center drilling, plain turning, Step turning, Taper turning, Grooving, Knurling & Chamfering on Centre Lathe machine

# EXPERIMENT NO.1

**OBJECTIVE** - To Study the working of Lathe machine tool.

## LATHE

A lathe is a powered mechanical device in which the work is held and rotated against a suitable cutting tool for producing cylindrical forms in the metal, wood or any other machinable material. (See Fig.1)

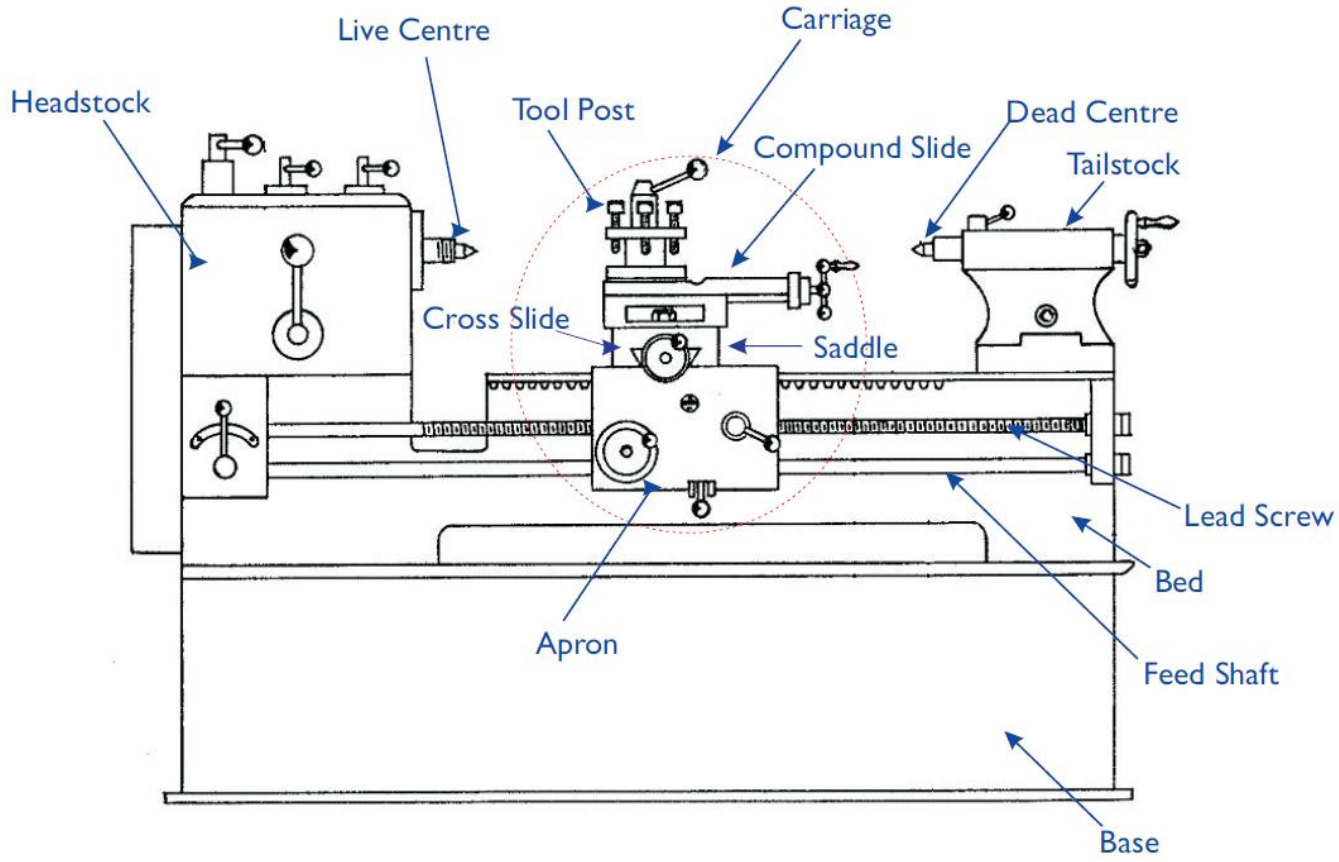



Fig.1

## THE PRINCIPLE PART OF LATHE

1. **BED:** It is the base of lathe. It is casting made in one piece. It holds or supports all other parts of lathe. (See fig.1)
2. **HEAD STOCK:** It is a permanently fastened on the inner ways at the left hand end of the bed. It supports spindle and driving arrangements. All lathes receive their power through head stock. (See fig.1)
3. **TAILSTOCK:** It is the counter part of head stock of is situated at the right end of the bed. It is used for supporting the work when turning on centers or when a long component is to be held in a chuck. (See fig.1)
4. **CARRIAGE:** It is located between headstock. It can slide along bed guide ways and be locked at any position by tightening the carriage lock screws. It consists of following five main parts of lathe. (See fig.1)

5. **APRRON:** It is fastened to saddle. It contains gears and clutches for transmitting motion from feed rod and hand wheel to the carriage. Also split nut which engages with the lead screw during threading. The Clutch mechanism is used for transmitting motion from feed rod whereas the split nut along with the lead screw moves the carriage during thread cutting. (See fig.1)

1. **SADDLE:** It is made up of H shaped casting. It aids saddle to slide on bed guide ways by operating hand wheels. (See fig.1)

2. **COMPOUND REST**: It supports the tool post and cutting tool in its various positions. It maybe swiveled on the cross-side to any angle in the horizontal plane. (See fig.29)

3. **CROSS-SLIDE:** It is provided with a female dovetail on one side and assembled on top of saddle having a mail dovetail.(See fig.1)

4. **TOOL POST:** It is used to hold various tool holders and tools. (See fig.1)

**SPECIFICATION OF LATHE**

The size of the lathe is specified by one of the following ways:

A) Length of the bed.
B) Distance between centers
C) Diameter of the work which can be turned between the ways
D) Swing over carriage.

**OUTCOME**: - On successful completion of this experiment, the students will be able to understanding the specification & working of center lathe machine tool and demonstrate it.

# EPERIMENT NO.2

**OBJECTIVE: -** To perform the operations Facing, Center drilling, plain turning, Step turning, Taper turning, Grooving, Knurling & Chamfering on Centre Lathe machine.

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**TOOLS REQUIRED:** Lathe Machine, Steel Rule 12" or 6", Outside caliper, Vernier caliper, Single point cutting tool, Knurling tool, Center drill, Drill chuck ½", Spanner set, Parting tool, etc.

**MATERIAL REQUIRED:** Mild steel Bar of 25 mm dia. & 125mm length.

**DRAWING:** (See fig. 2 & 3).

**THEORY:- LATHE OPERATIONS:**

**Turning:-**Turning is the operation to remove the material from the outside diameter of a work piece to obtain the finished surface. (See fig.4)

**Facing: -** Is the operation of machining the end of a work piece to make the end square with owns axis and that of the lathe. The tool moves perpendicular to axis of the lathe. (See fig.4)

**Drilling: -** Drilling is operation of making hole in work piece. This is done by holding the drill in the tail stock quill. (See fig.4)

**Reaming:** Reaming is the operation of finishing the drilled hole. This is done by holding the reamers in the tail stock quill. (See fig.4)

**Boring: -** Boring is the operation of enlarging the drilled hole of the work piece is held in chuck in lathe spindle and boring bar is mounted in the tool post. The boring is done by moving the carriage towards the head stock. (See fig.4)

**KNURLING: -** It is the operation of plastically displacing metal in to a particular pattern for the purpose of creating a hand grip or roughened surface on a work piece. The knurling tool is held in the tool post and is pressed against the surface of the work piece by the cross feed. (See fig.4)

**Threading: -** Threading is nothing but cutting helical groove on a work piece. Threads may be cut either on the internal or external cylindrical surfaces. A specially shaped cutting tool, known as thread cutting tool, is used for this purpose. Thread cutting in a lathe is performed by traversing the cutting tool at a definite rate, in proportion to the rate at which the work revolves. (See fig.4)

**Chamfering: -** It is the operation of beveling the extreme end of a work piece. Chamfer is provided for better look, to enable nut to pass freely on threaded work piece, to remove burrs and protect the end of the work piece from being damaged. (See fig.4)

**PROCEDURE:**

1. Understand the job drawing thoroughly and plan the job.
2. Cut off a 130mm long piece from 25 mm dia. Bar.
3. Hold the work piece in the Lathe chuck and perform facing and center drill operations. Repeat the same on the other side also.
4. Hold the job in between live and dead centers.
5. Perform plain turning, chamfering and knurling operations on one side and interchange the faces axially.
6. Perform plane turning by swiveling the compound rest at required angle.
7. Now start threading by setting levers as per requirement.
8. After filing if required, take off the job from m/c and do oiling in the whole job for the protection from the rust.

**PRECAUTION:**

1. Don't wear loose clothes while working on the machine.
2. Work piece should be held tightly between the live and dead centers.
3. Always clean machine before use.
4. Cutting tools should be held tightly in the tool holder.
5. Never let your clothes and hand come in contact with the revolving chuck, pulleys etc.
6. Do not touch the chips when machine is removing them
7. Do not give large feed to the cutting tool.

**OUTCOME**: - On successful completion of this experiment, the students will be able to understanding the different operation which can be done on center lathe machine.

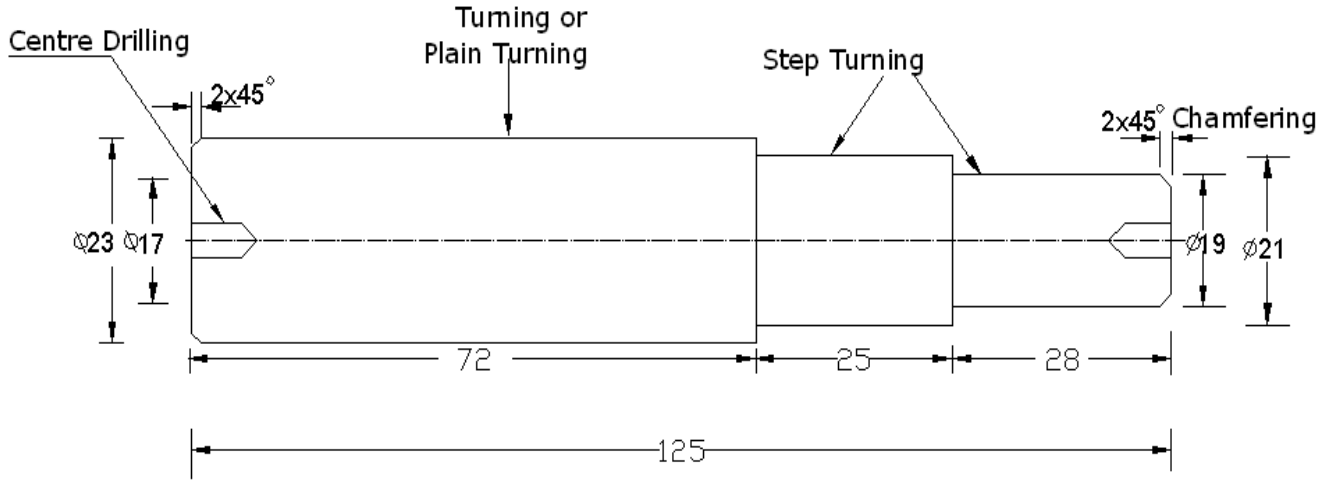
Centre Drilling
Turning or
Plain Turning
Step Turning
2x45°
2x45° Chamfering
Ø23
Ø17
Ø19
Ø21
72
25
28
125

Fig. 2

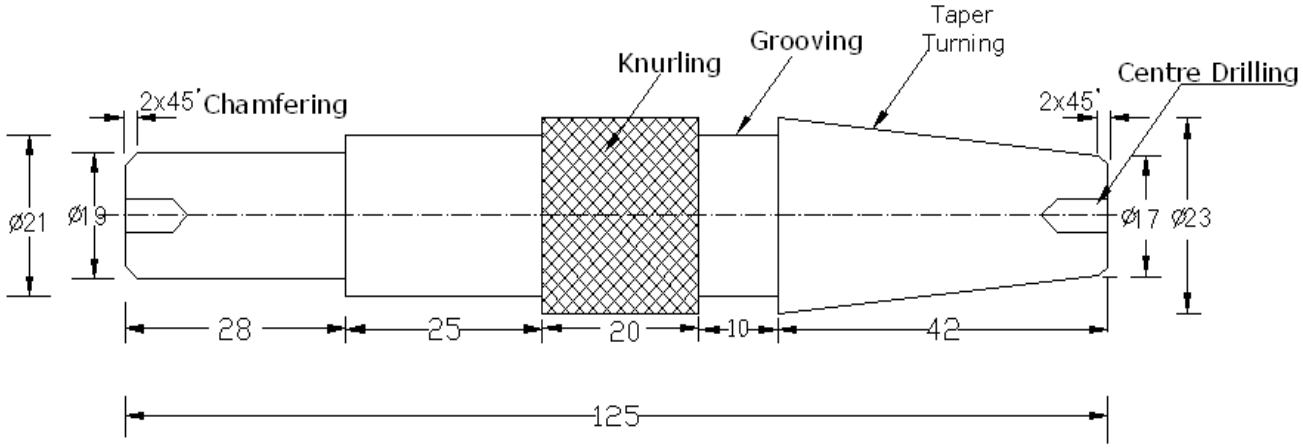
Knurling
Grooving
Taper
Turning
Centre Drilling
2x45° Chamfering
2x45°
Ø21
Ø19
Ø17
Ø23
28
25
20
10
42
125

Fig. 3

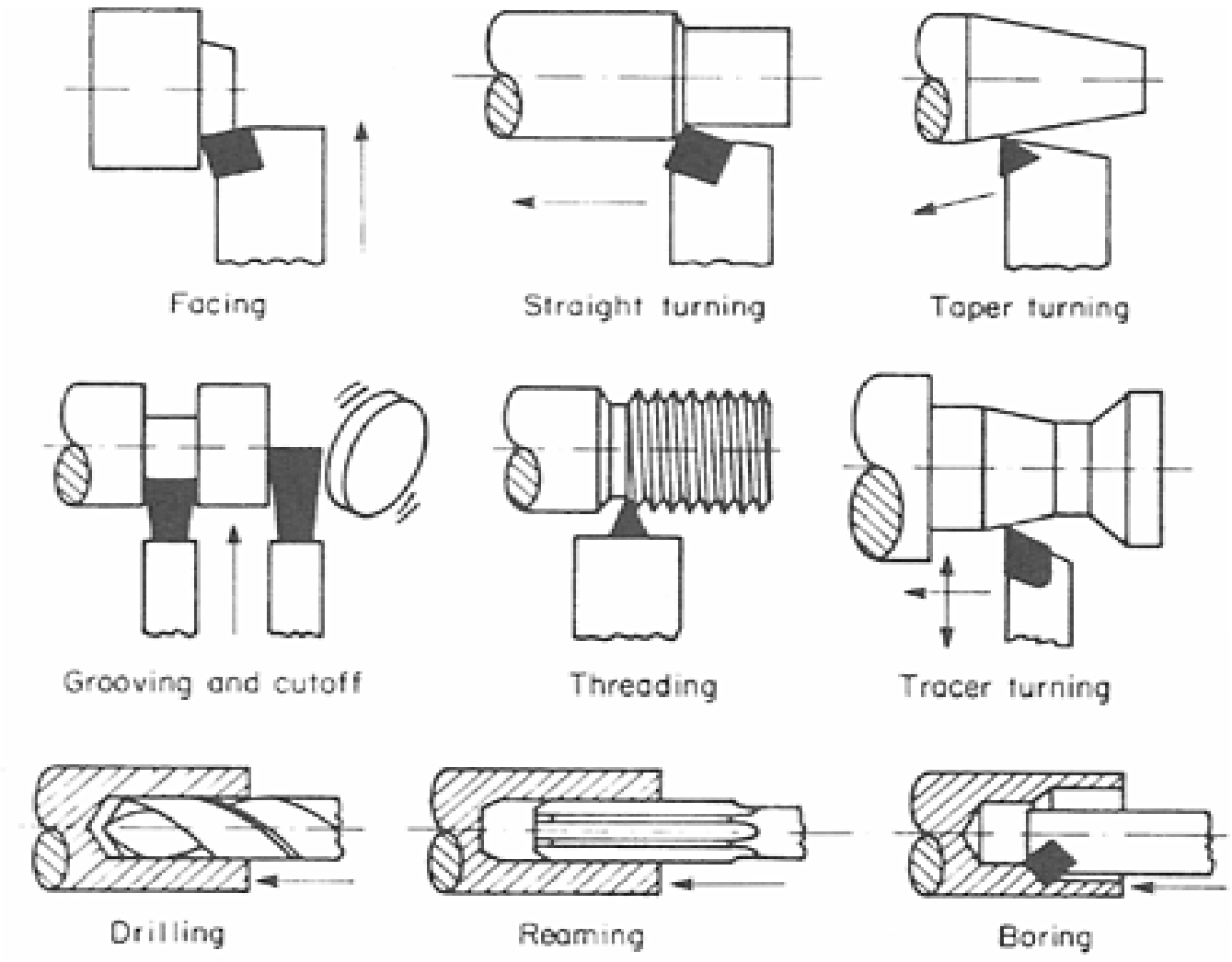
Facing
Straight turning
Taper turning
Grooving and cutoff
Threading
Tracer turning
Drilling
Reaming
Boring

Fig. 3