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Aim of Experiment:

To prepare a cylindrical job of multiple lathe operations

Raw material required:

MS round bar [ $\phi$  25 mm x 82 mm]

Tools required:

Steel rule, chuck key, marking block, tool post key, V-cutting tool, knurling tool, packing, vernier calliper, grooving tool, brush.

Introduction:

In the mechanical engineering field, lathe machine plays an important role in manufacturing. A lathe is a machine tool which is used to remove unwanted metals from the work piece to give desired shape and size. Lathe machine is one of the most important machine tool which is used in the metalworking industry. It operates on the principle of a rotating work piece and a fixed cutting tool. It was invented by David Wilkinson.

Parts of a lathe machine tool:

1. Headstock
2. Bed
3. Tailstock
4. Carriage
5. Saddle
6. Cross-slide
7. Compound rest
8. Toolpost
9. Apron
10. Lead screw
11. Feed rod
12. Chuck
13. Main spindle
14. Leg



### Cutting Parameters:

- Cutting speed ( $m/min$ ) - The speed of the workpiece surface relative to the edge of the cutting tool during a cut.
- Feed rate ( $mm/rev$ ) - It is the distance travel by the cutting tool in one revolution of workpiece in the cutting process.
- axial depth of cut ( $mm$ ) - The depth of the tool along the axis of the workpiece as it makes a cut, as in a turning or boring operation.
- Radial depth of cut ( $mm$ ) - The depth of the tool along the radius of the workpiece as it makes a cut, as in turning or boring operation.

### Lathe Operations Involved:

There are six different operations required to accomplish the required aim of experiment and these are as follows:

Facing operation: A single point turning tool moves radially, along the end of the workpiece, removing a thin layer of material to provide a smooth flat surface. The facing depth of the face, typically very small, may be machined in a single pass or may be reached by machining at a smaller axial depth of cut and making multiple passes.

Plain turning: A single point turning tool moves axially, along the side of the workpiece, removing material to form



different features, including steps, tapers, chamfers and contours. These features are typically machined at a small radial depth of cut and multiple passes are made until the end diameter is reached.

**Grooving:** A single point turning tool moves radially, into the side of the workpiece, cutting a groove equal in width to the cutting tool.

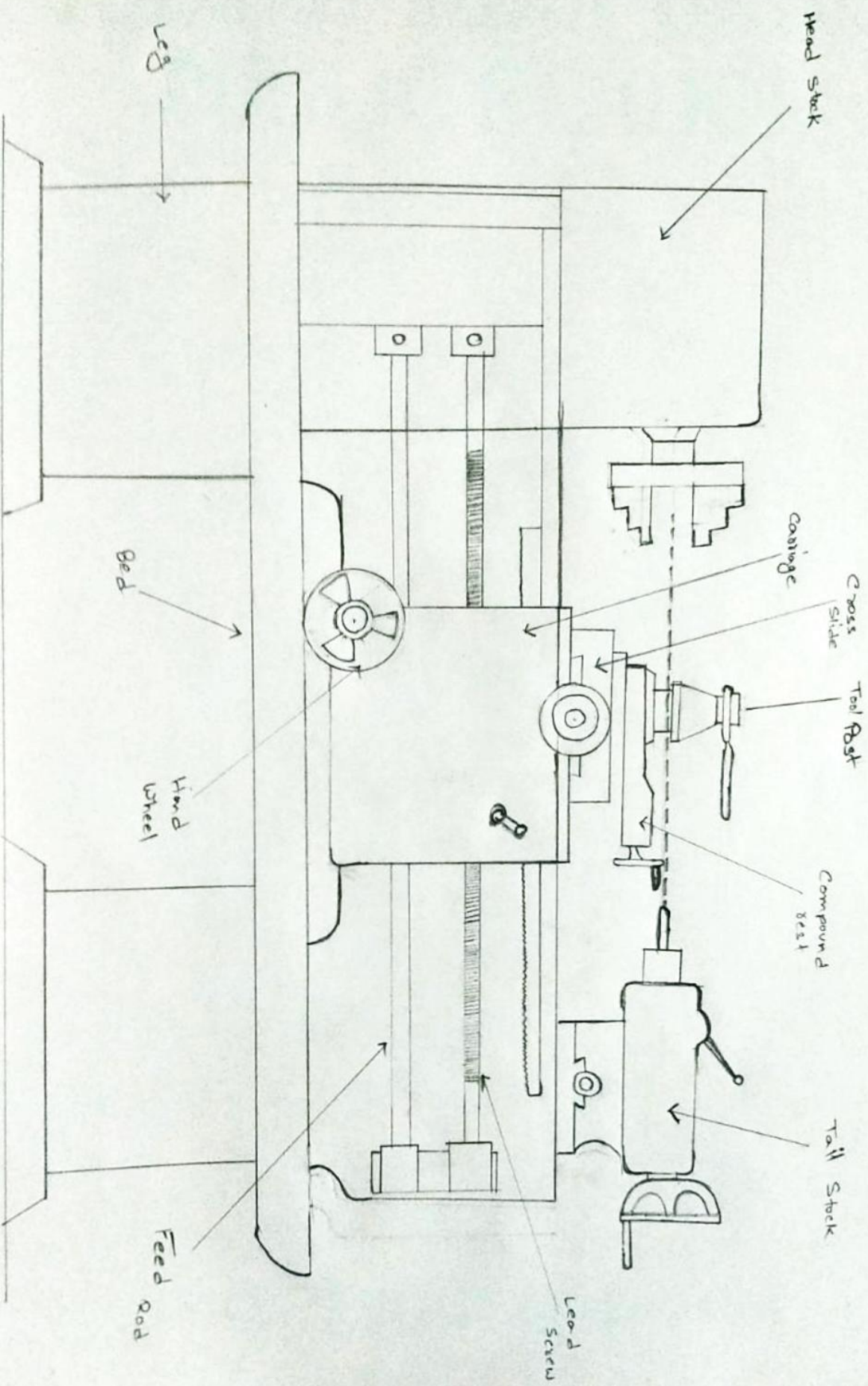
**Taper Turning:** A taper is defined as a uniform decrease or increase in the diameter of a workpiece along with its length. The operation by which a conical surface of the gradual reduction in diameter from a cylindrical workpiece is produced is called taper turning.

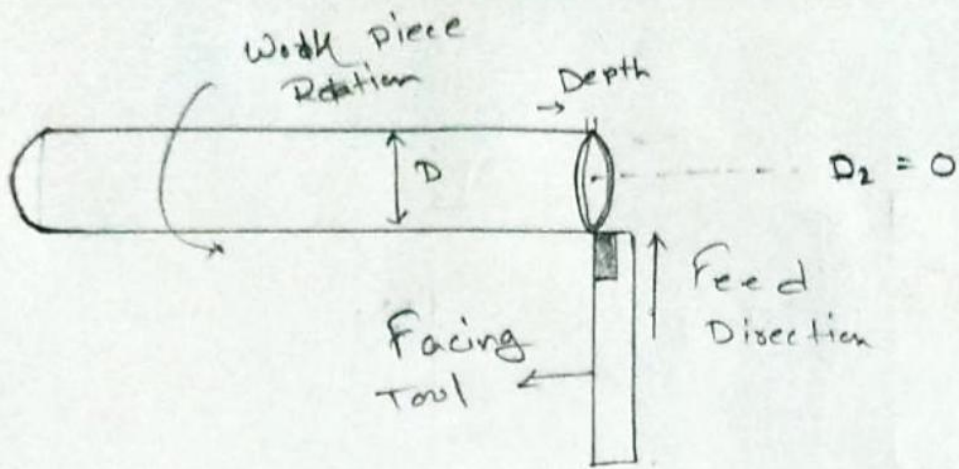
**Knurling:** It is the process of producing a rough surface on the workpiece to provide effective gripping. This process tool is held rigidly on the tool post and pressed against the rotating job so that leaving the exact facsimile of the tool on the surface of the job.

**Step Turning:** Step turning is an operation similar to creating a stair case on a work piece. Here excess materials from the workpiece is removed non-uniformly i.e., in various steps with different dimensions.

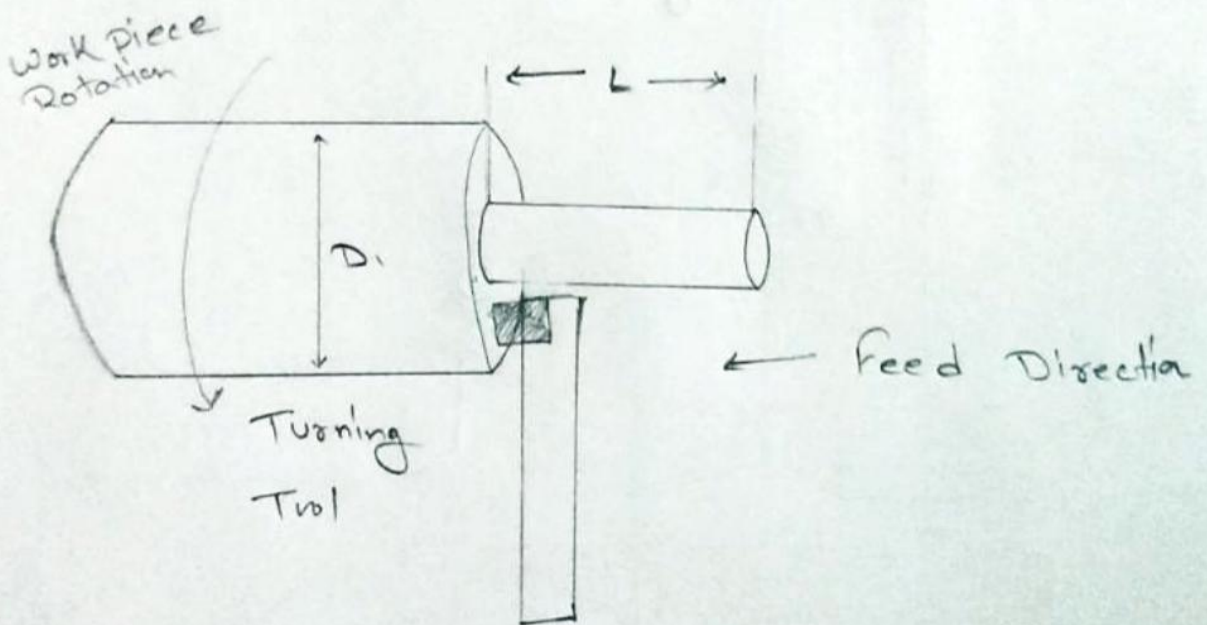
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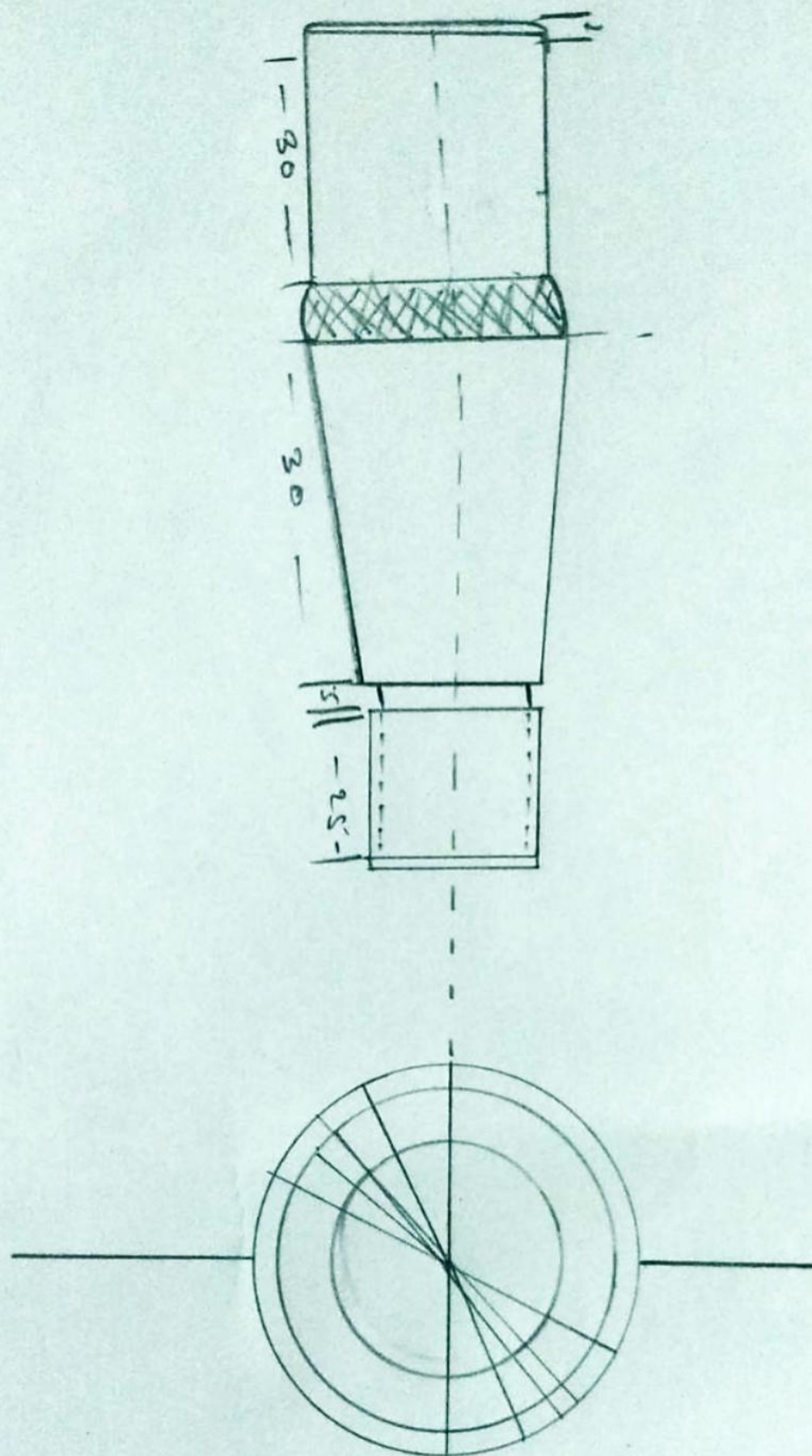




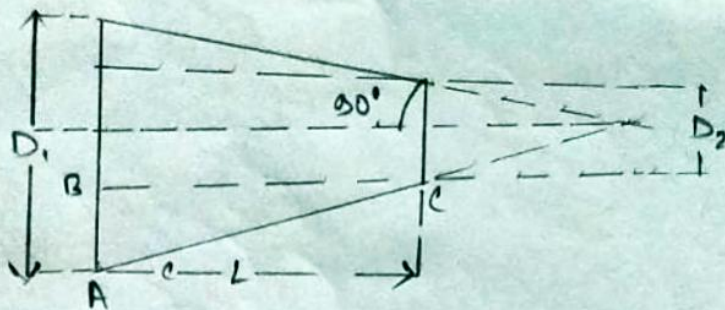
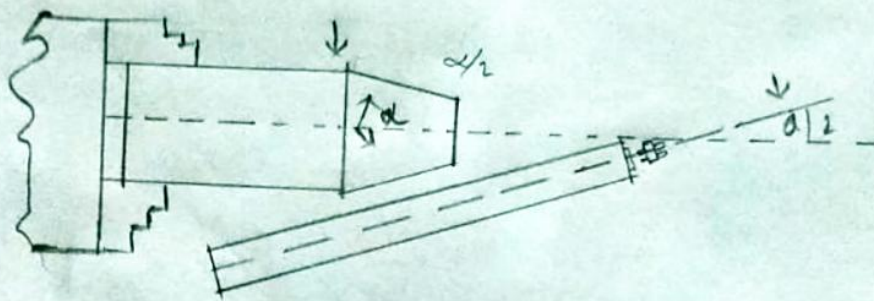
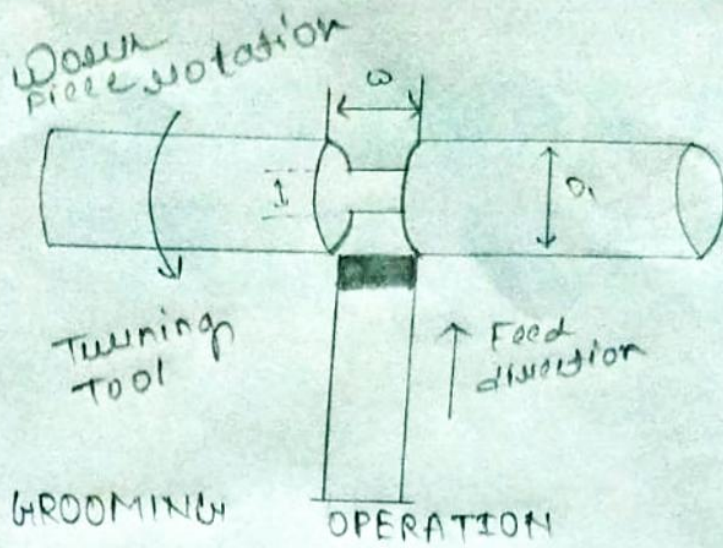
## FACING OPERATION



## PLAIN TURNING OPERATION

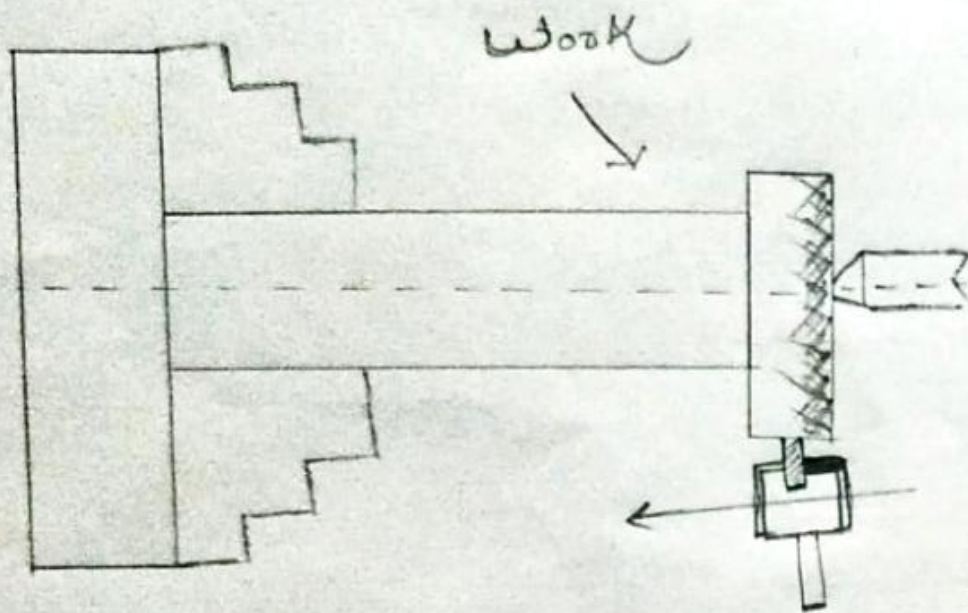




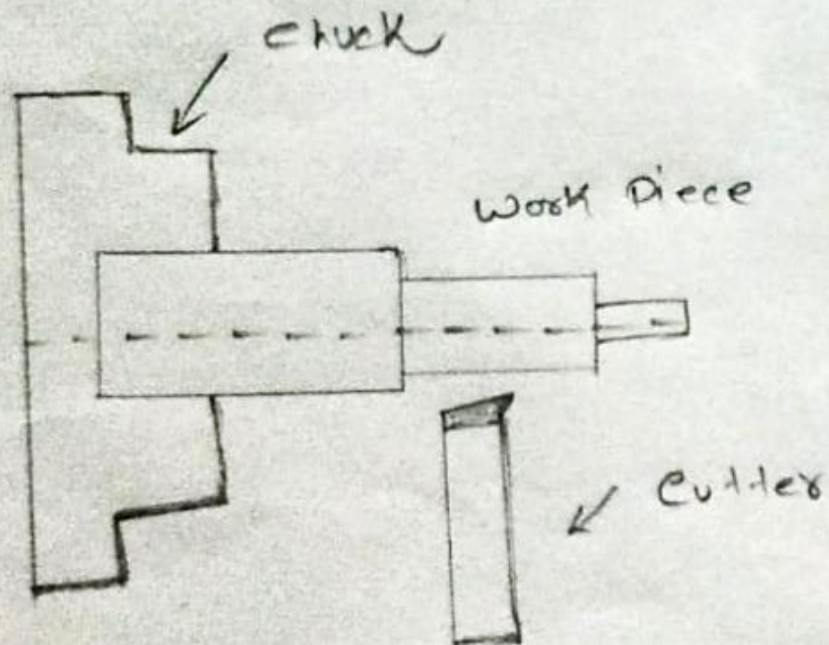


$$\text{Taper} = \tan \alpha = \frac{D_1 - D_2}{2L}$$

TAPER TURNING OPERATION



KNURLING OPERATION



STEP TURNING OPERATION



### Safety Precaution:

Safety precautions to be followed in turning section:

- Always wear gloves, to avoid injuries to hand by sharp edges and corners of the cut piece.
- Maintain proper distance from the machine to avoid any inadvertent accident.
- Wear glass to avoid striking of cutting chips into your eyes.
- Do not wear loose dresses and make sure you are tying your hair tightly.

### Experimental procedure:

Step by step procedure:

- Fix the cylindrical workpiece in the chuck using chuck key and true it by using marking block.
- Fix the single point cutting tool in the tool post so its cutting point coincides with the axis of the job.
- Perform facing, plain turning and chamfering operation as per requirement.
- Fix the grooving tool to perform the grooving operation
- Then, fix the knurling tool to do the knurling operation.

### Conclusion:

By using the different lathe machine operations, the given workpiece with exact dimension are produced successfully.