

13. Make a step Turning on MS rod using Lathe Machine Tool

# INTRODUCTION

- Machining is a process where minute/ small quantity of material is removed from the parent material to get required shape, size and surface finish.
- There are many ways to do machining and for large scale production of parts widely employed machines are
  - 1) Lathe machine
  - 2) Milling machine
  - 3) Shaper machine
  - 4) Planer machine
  - 5) Hobbing machine
  - 6) Grinding machine

## Lathe Machine

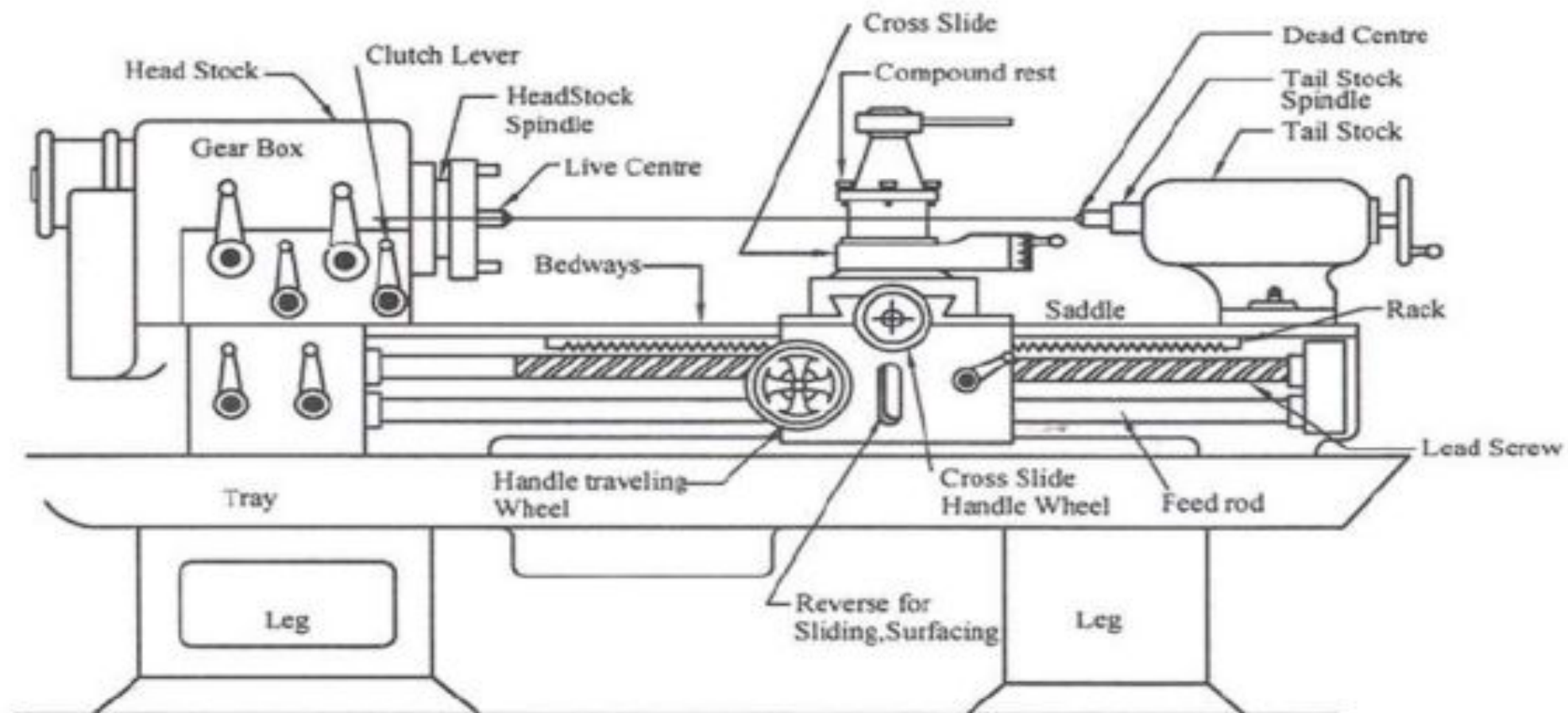


Fig. 1. Centre Lathe Machine

# LATHE MACHINE

- Lathe is the machine that is used to perform several operations on the work piece. Lathe is useful in making several parts and further the parts are assembled to make new machine. Hence lathe is popularly called as “mother of machines”
- There are different types of lathe machines, they are
  - i. Centre lathe
  - ii. Tool room lathe
  - iii. Bench lathe
  - iv. Capstan lathe
  - v. Turret lathe
  - vi. Automatic lathe

# Chucks

- Used extensively for holding work for machining operations
  - Work large or unusual shape
- Most commonly used lathe chucks
  - Three-jaw universal
  - Four-jaw independent
  - Collet chuck

# Three-jaw Universal Chuck

- Holds round and hexagonal work
- Grasps work quickly and accurate within few thousandths/inch
- Three jaws move simultaneously when adjusted by chuck wrench
  - Caused by scroll plate into which all three jaws fit
- Usually has three jaws which move in unison as an adjusting pinion is rotated.
- The advantage of the universal scroll chuck is its ease of operation in centering work for concentric turning.
- This chuck is not as accurate as the independent



# Four Jaw Independent Chuck

- Used to hold round, square, hexagonal, and irregularly shaped workpieces
- Has four jaws
  - Each can be adjusted independently by chuck wrench
- Jaws can be reversed to hold work by inside diameter

# TYPES OF CHUCK



**Three jaw  
chuck**

- For holding cylindrical stock centered.
- For facing/center drilling, etc.



**Four-Jaw  
Chuck**

- This is independent chuck generally has four jaws , which are adjusted individually on the chuck face by means of adjusting screws



## Collet Chuck



**Collet chuck is used to hold small workpieces**

## Magnetic Chuck



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

# Work holding Devices

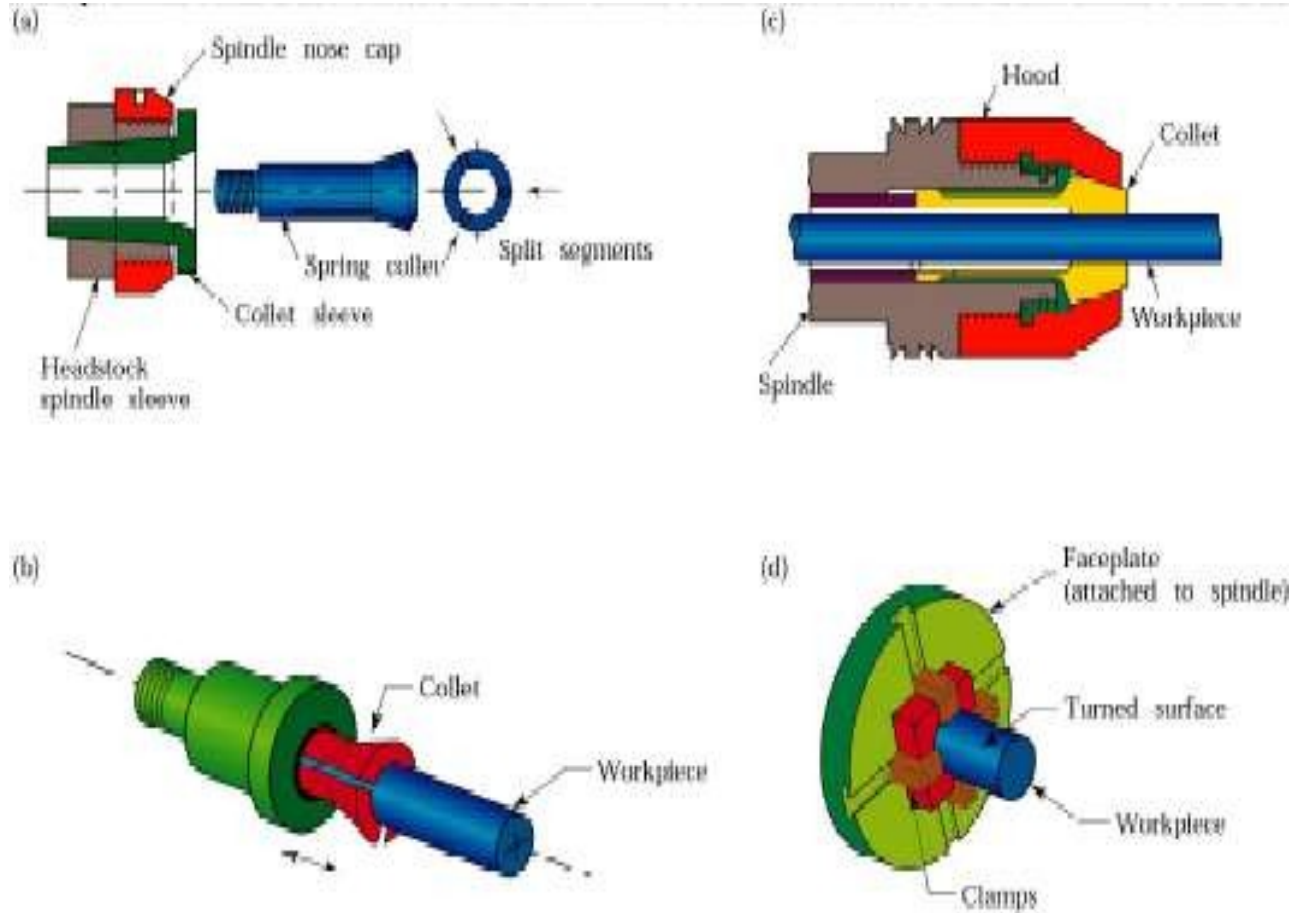
## Chucks

usually equipped with 3 or 4 jaws

**3 jaw chucks** generally are self centering. Used for round work pieces.

Can be centered within .025mm independently

**4 jaw chucks** are for square, rectangular, or odd-shaped work pieces



(a) and (b) Schematic illustrations of a draw-in-type collets. *The workpiece is placed in the collet hole, and the conical surfaces of the collet are forced inward by pulling it with a draw bar into the sleeve.* (c) A push-out type collet. (d) Workholding of a part on a face plate.

# Chucks

- Used extensively for holding work for machining operations
  - Work large or unusual shape
- Most commonly used lathe chucks
  - Three-jaw universal
  - Four-jaw independent
  - Collet chuck

# Three-jaw Universal Chuck

- Holds round and hexagonal work
- Grasps work quickly and accurate within few thousandths/inch
- Three jaws move simultaneously when adjusted by chuck wrench
  - Caused by scroll plate into which all three jaws fit
- Usually has three jaws which move in unison as an adjusting pinion is rotated.
- The advantage of the universal scroll chuck is its ease of operation in centering work for concentric turning.
- This chuck is not as accurate as the independent



# Four Jaw Independent Chuck

- Used to hold round, square, hexagonal, and irregularly shaped workpieces
- Has four jaws
  - Each can be adjusted independently by chuck wrench
- Jaws can be reversed to hold work by inside diameter

# TYPES OF CHUCK



**Three jaw  
chuck**

- For holding cylindrical stock centered.
- For facing/center drilling, etc.



**Four-Jaw  
Chuck**

- This is independent chuck generally has four jaws , which are adjusted individually on the chuck face by means of adjusting screws

## Collet Chuck



**Collet chuck is used to hold small workpieces**

## Magnetic Chuck



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

# Work holding Devices

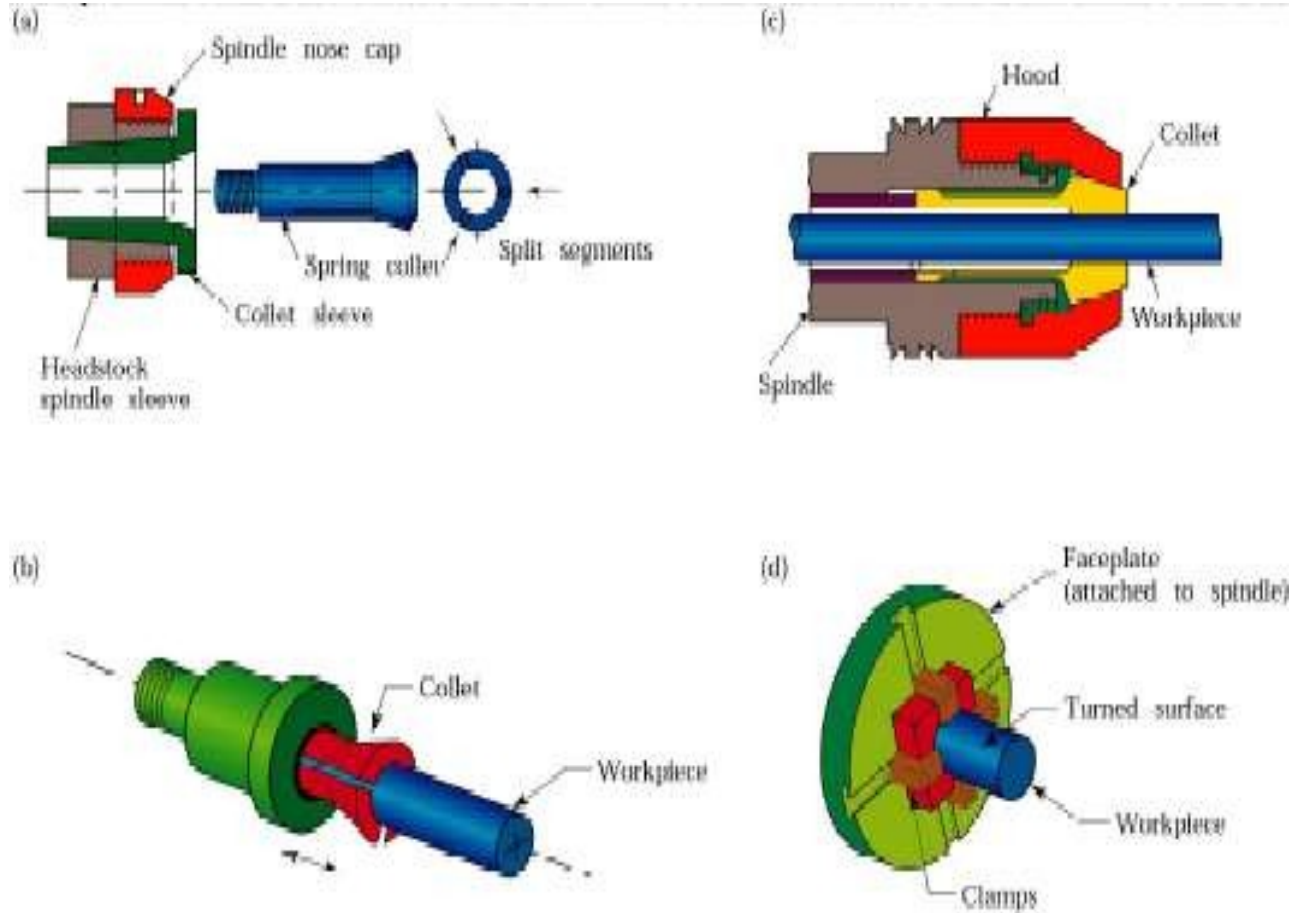
## Chucks

usually equipped with 3 or 4 jaws

**3 jaw chucks** generally are self centering. Used for round work pieces.

Can be centered within .025mm independently

**4 jaw chucks** are for square, rectangular, or odd-shaped work pieces

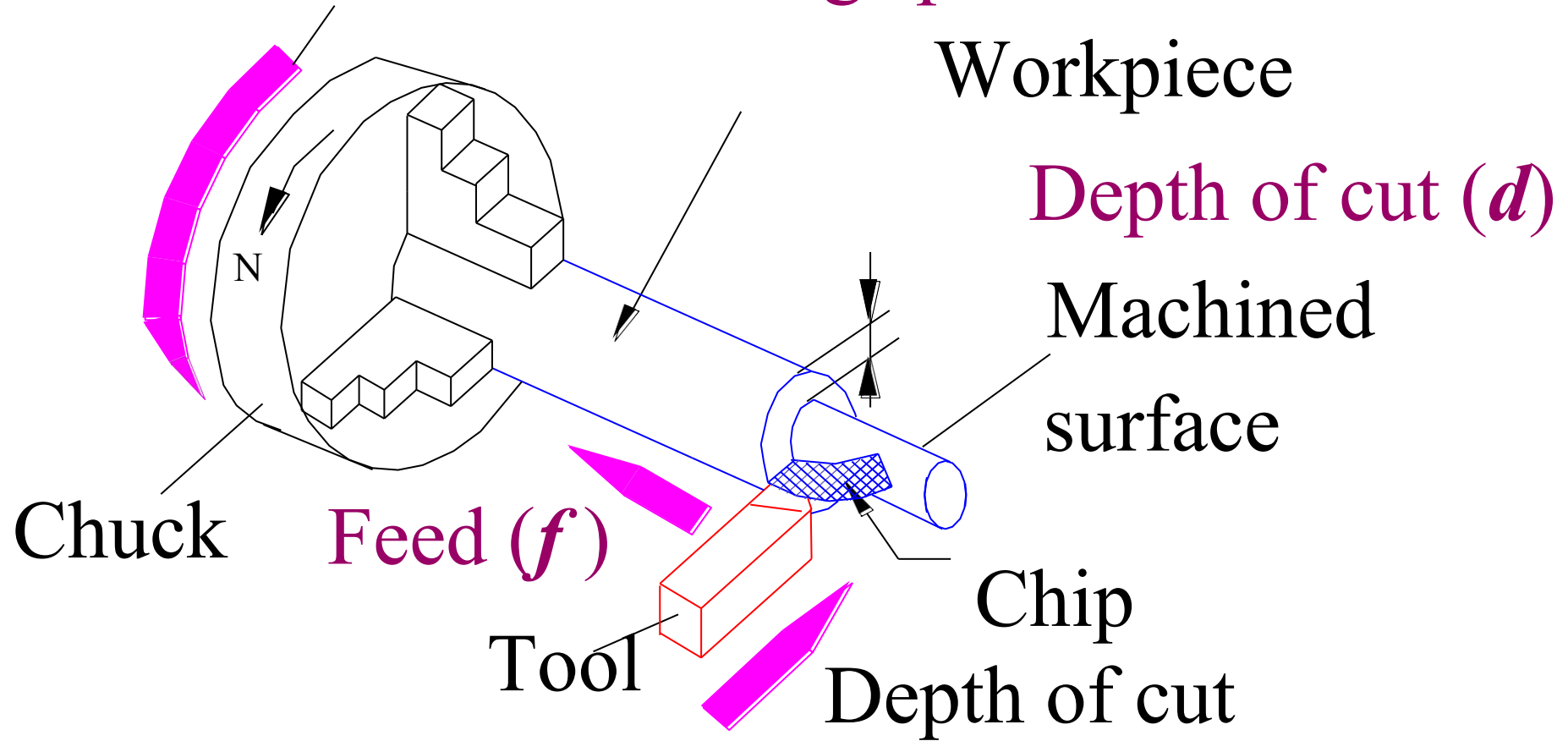


(a) and (b) Schematic illustrations of a draw-in-type collets. *The workpiece is placed in the collet hole, and the conical surfaces of the collet are forced inward by pulling it with a draw bar into the sleeve.* (c) A push-out type collet. (d) Workholding of a part on a face plate.

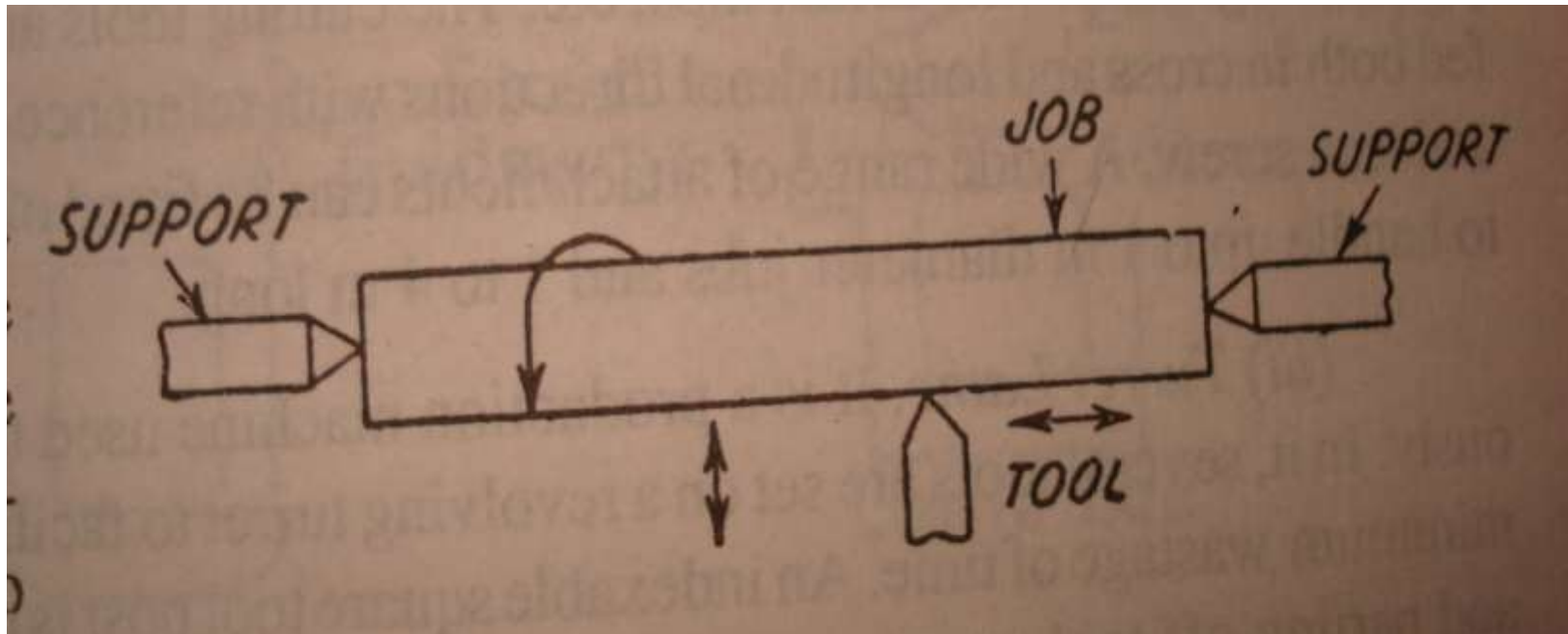


# Operating Conditions

Cutting speed



# Working principle of lathe



1) Operation done either by holding the work piece between centres or by a chuck.

a) Turning

1) Plain or Straight Turning

2) Rough Turning

3) Shoulder Turning or Step Turning

4) Taper Turning

5) Eccentric Turning

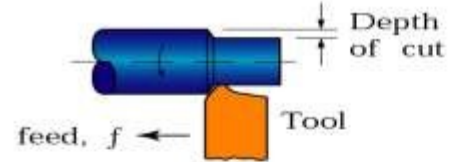
- b) Facing
- c) Chamfering
- d) Knurling
- e) Thread cutting
- f) Filing
- g) Polishing
- h) Grooving
- i) Spinning
- j) Spring Winding
- k) Forming

## 2) Operation done by holding the work by a chuck or a faceplate or an angle plate

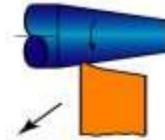
- a) Drilling
- b) Reaming
- c) Boring
- d) Counter boring
- e) Taper boring
- f) Tapping
- g) Undercutting
- h) Internal thread cutting
- i) Parting-off

# LATHE OPERATIONS

(a) Straight turning



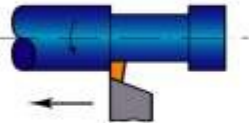
(b) Taper turning



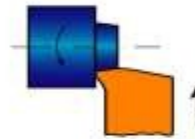
(c) Profiling



(d) Turning and external grooving



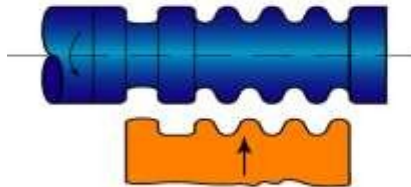
(e) Facing



(f) Face grooving



(g) Cutting with a form tool



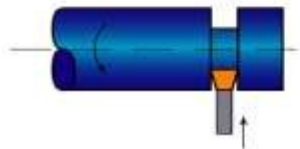
(h) Boring and internal grooving



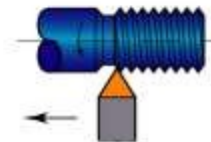
(i) Drilling



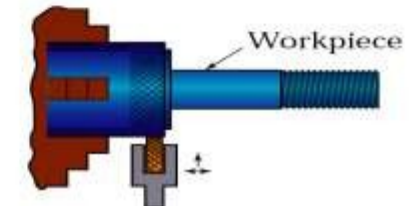
(j) Cutting off



(k) Threading

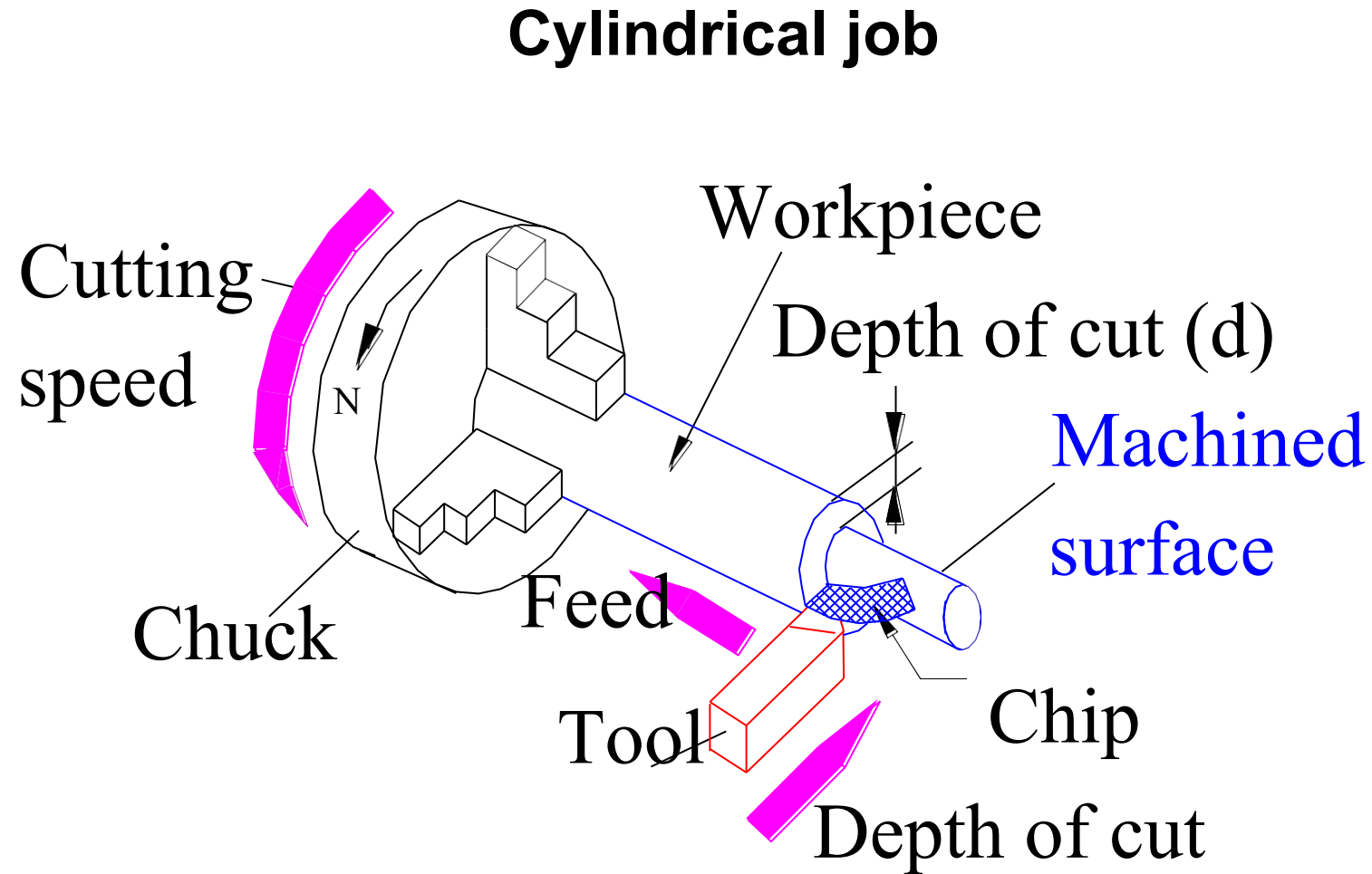


(l) Knurling



# Turning ..

## Operations on Lathe ..



# Turning ..

## **Operations on Lathe ..**

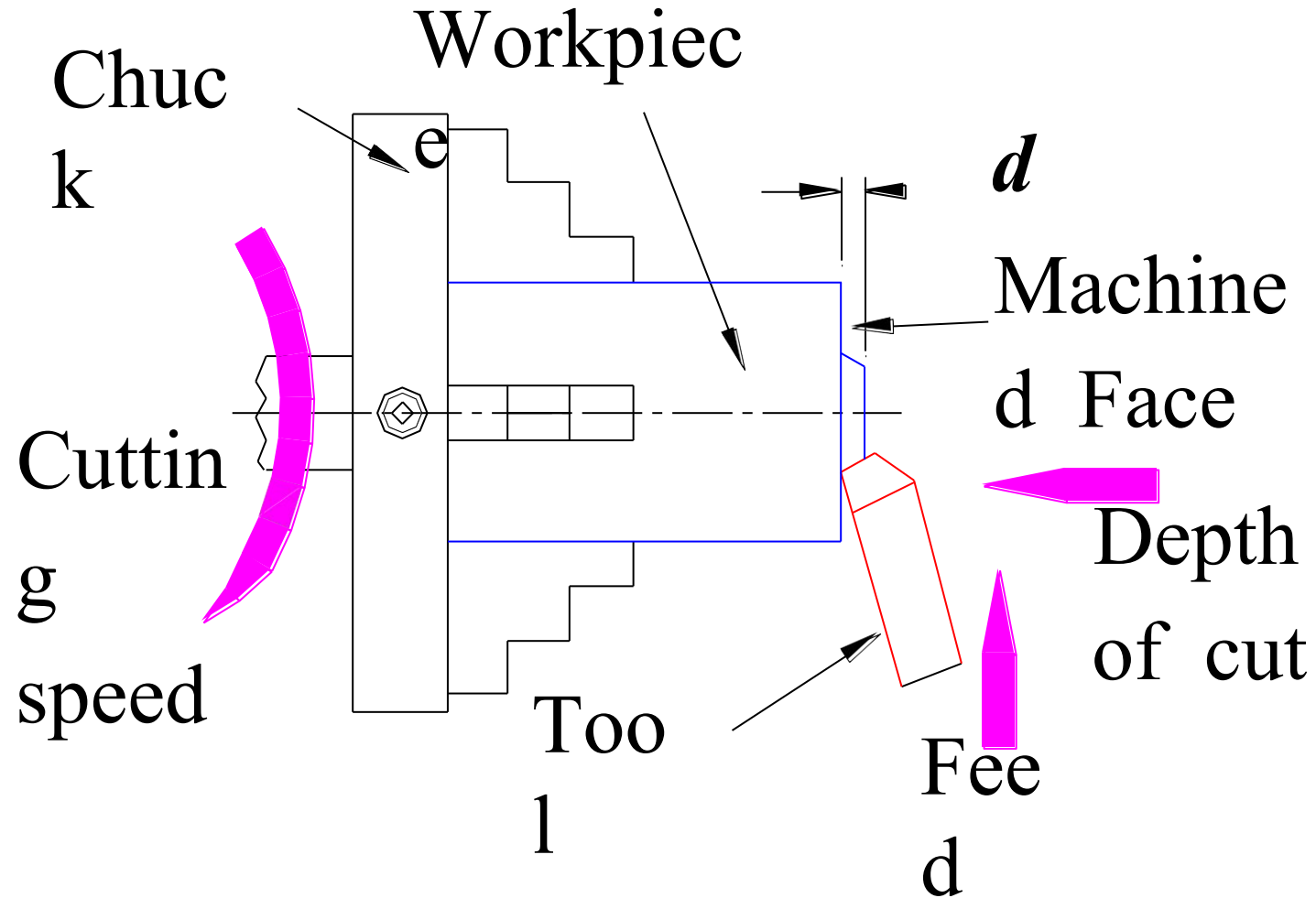
- Excess Material is removed to reduce Diameter
- Cutting Tool: *Turning Tool*
- Work is held in either chuck or between centers.
- Longitudinal feed is given to the tool either by hand or power.



# Facing

Flat Surface/Reduce length

Operations on Lathe..



# Facing ..

## *Operations on Lathe ..*

- machine end of job  $\Rightarrow$  Flat surface or to Reduce Length of Job
- Turning Tool
- Feed: in direction perpendicular to workpiece axis
  - Length of Tool Travel = radius of workpiece
- Depth of Cut: in direction parallel to workpiece axis

# PERFORM STEP TURNING IN LATHE

AIM:

To perform plain turning and step turning on a cylindrical work piece

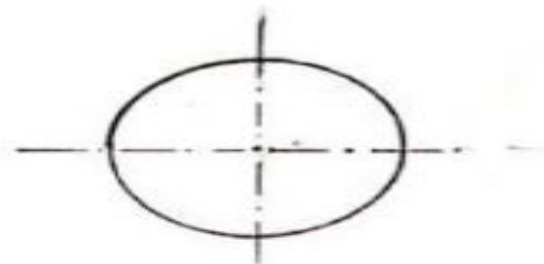
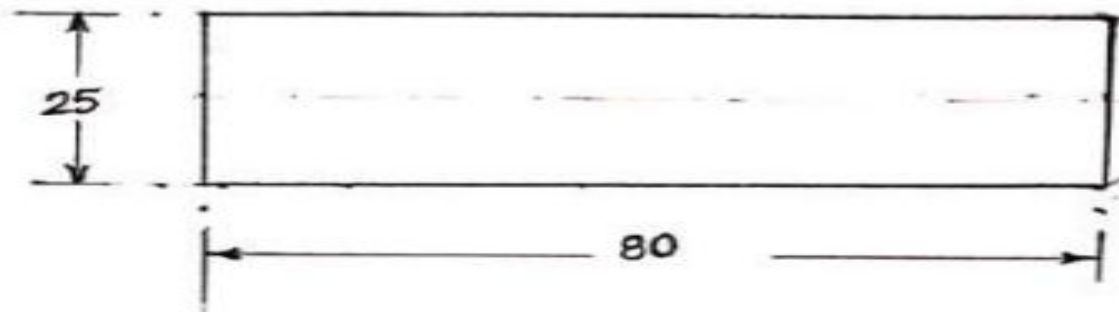
MATERIALS REQUIRED:

Mild steel rod

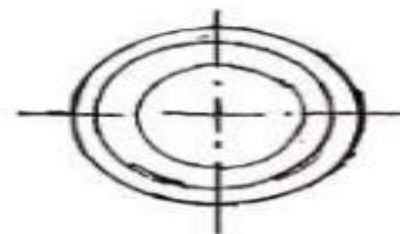
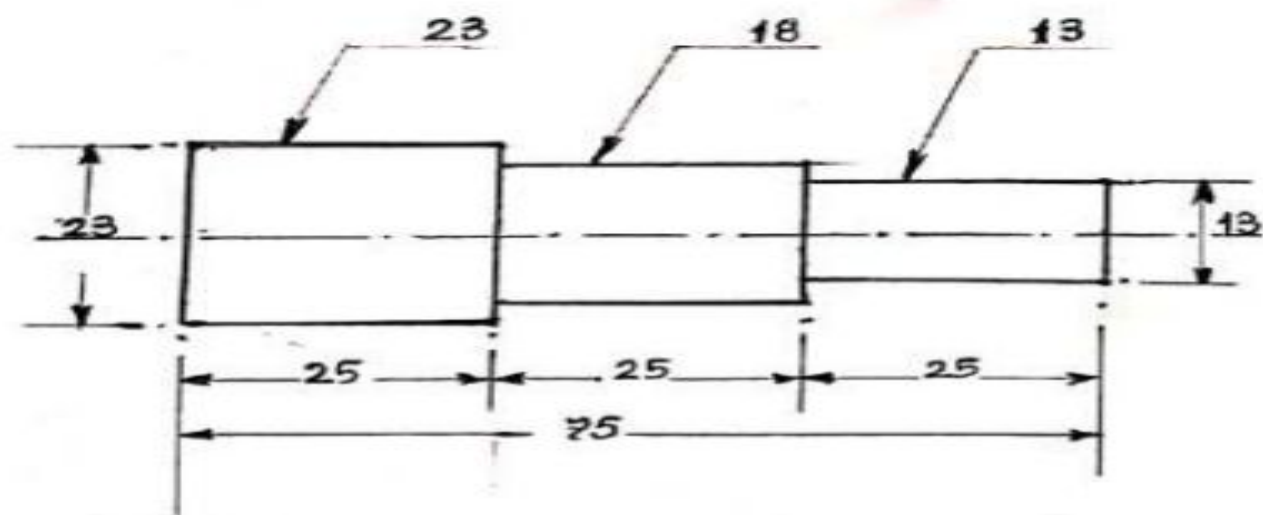
TOOLS REQUIRED

Chuck key, Vernier caliper, Single-point cutting tool

## Step turning



## Given material



# PROCEDURE

1. First loosen the jaw in the chuck to position the work piece, and then tighten the jaws.
2. Fix the cutting tool in the tool post.
3. Switch on the lathe and move the carriage near to the work piece. Give it a small cross feed, and then move carriage longitudinally to the required length slowly.
4. Bring the carriage to the original position, give a small cross feed and move carriage longitudinally. Repeat this step until required diameter is obtained.
5. To get smooth surface give a very small feed when the diameter is nearing the required value

# PROCEDURE

6. The turning operation is done with cutting tool to reduce the diameter upto the required dimension for the two steps of various diameters.
7. The diameter of the work piece is to be reduced according to the given dimensions by turning process.
8. While doing the work piece one end of the work piece is reduced to the required diameter and after this, chamfering.
9. This process removes all sharp edges of the component.

# RESULT:

- Thus the required shape and size is obtained by step turning.