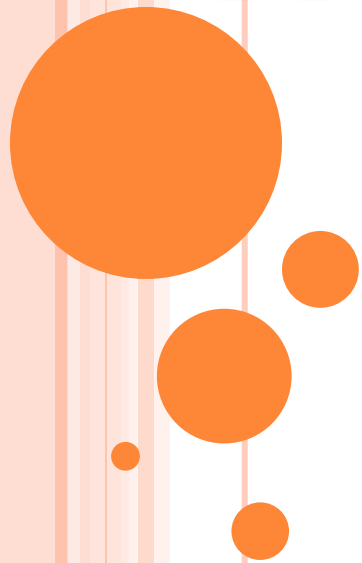


MACHINES

A.J.MORE
AISSMSIOIT



GROUP MEMBERS

- ◆ Poonam Shah
- ◆ Fainajabi Shaikh
- ◆ Pradnya Kale
- ◆ Sayali Udas
- ◆ Urmi Pal



MACHINES

- LATHE MACHINE**
- MILLING MACHINE**
- CNC & NC MACHINE**



LATHE MACHINE



LATHE MACHINE

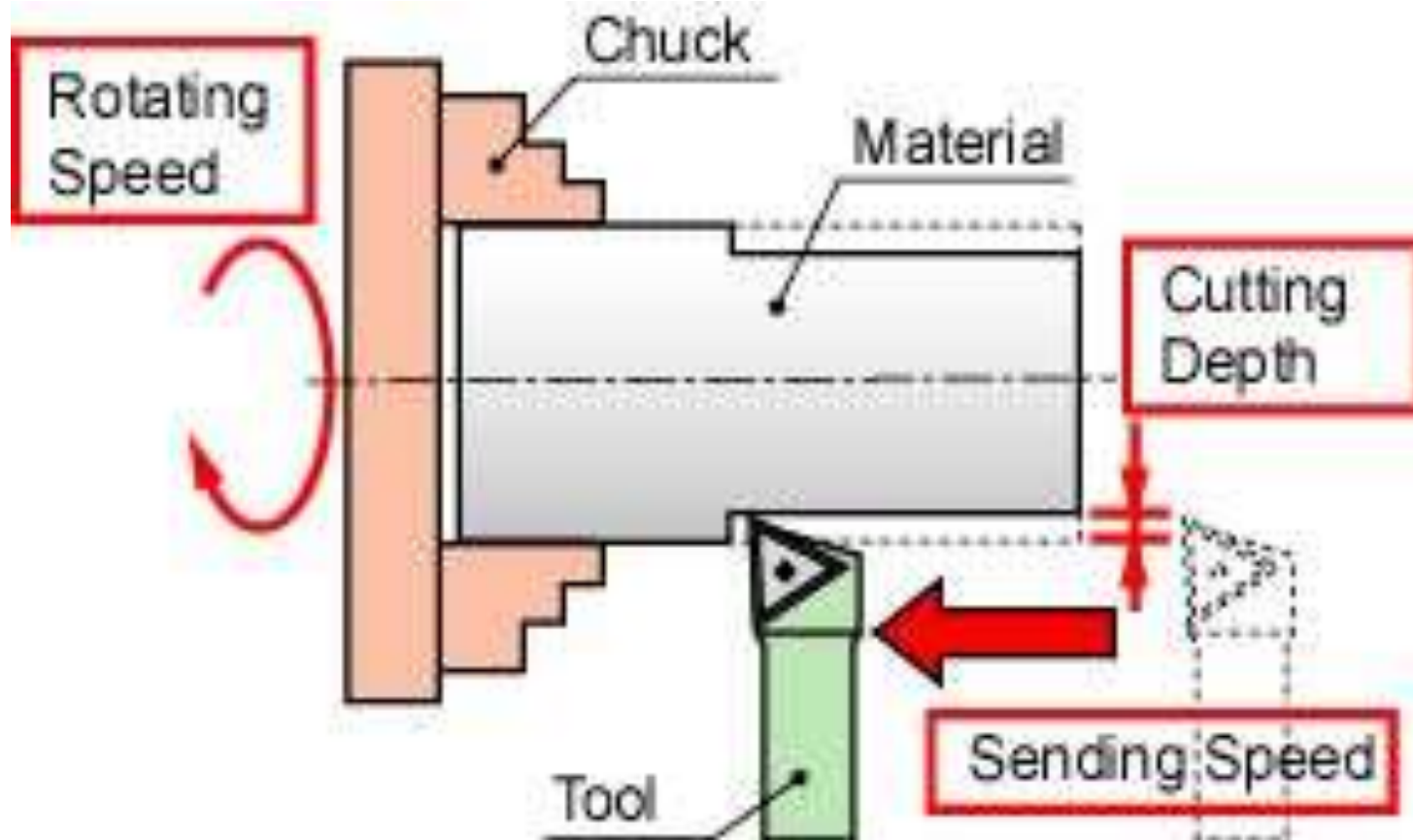
- Lathe Machine is a tool Basically used for removing the undesirable material, in the form of the chips, from the cylindrical surfaces.



LATHE MACHINE



PRINCIPLES OF OPERATION OF LATHE MACHINE



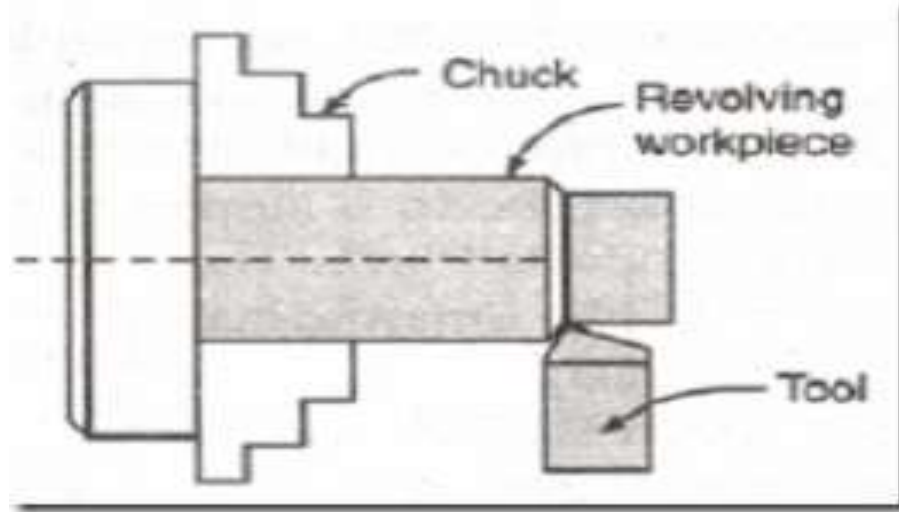
BASIC ELEMENTS OF LATHE MACHINE

1. Bed
2. Headstock
3. Tailstock
4. Carriage
5. Lead screw
6. Feed Drive

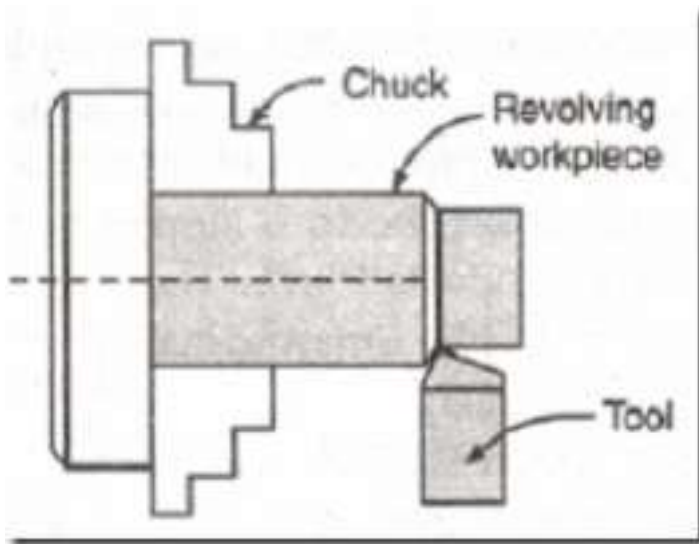


TYPES OF OPERATIONS PERFORMED ON LATHE MACHINE

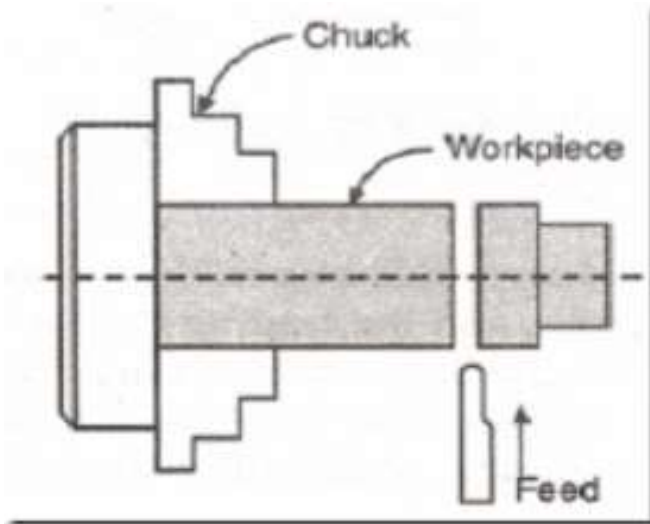
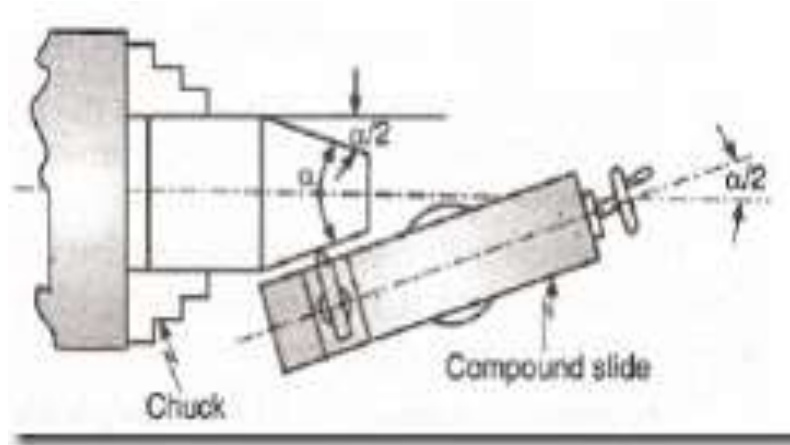
1. Turning--: It is the process of removing the material from the cylindrical surface of the workpiece to reduce its diameter.



2. Eccentric turning-: It is the process of removing the material from the cylindrical surface of the workpiece to reduce its diameter about an axis offset from the axis of the workpiece



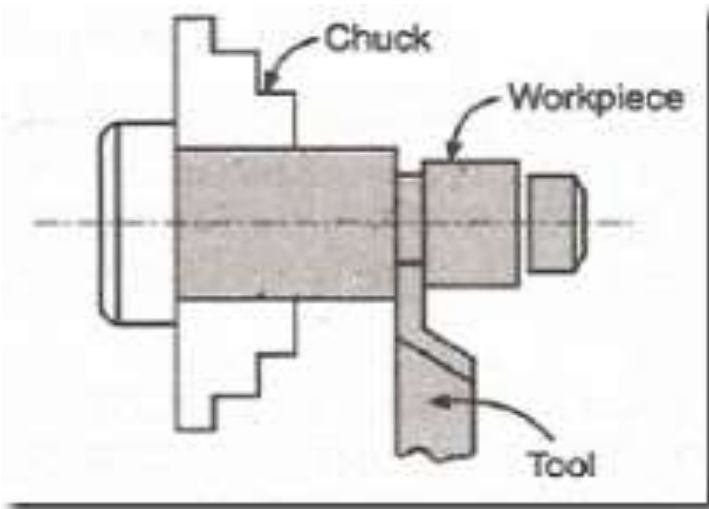
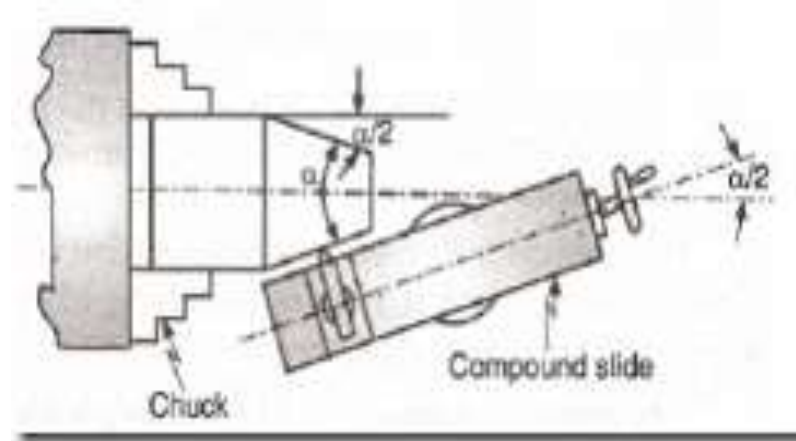
3. Taper Turning-:
Process of uniformly reducing the diameter of workpiece along its length.



4. Facing-:
The process of removing the material from the end surface or face of workpiece.



5. Chamfering:-the process of bevelling the sharp ends of a workpiece.



6. Grooving:-the process of providing a narrow groove on the cylindrical surface of the workpiece.



7. Parting:--the process of cutting a workpiece into 2 parts.

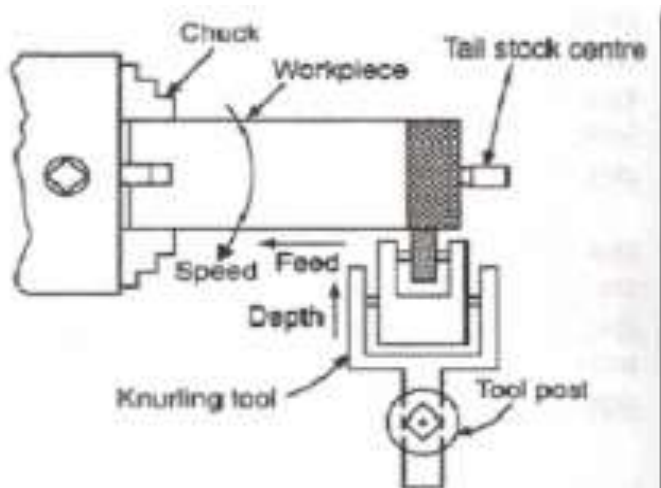
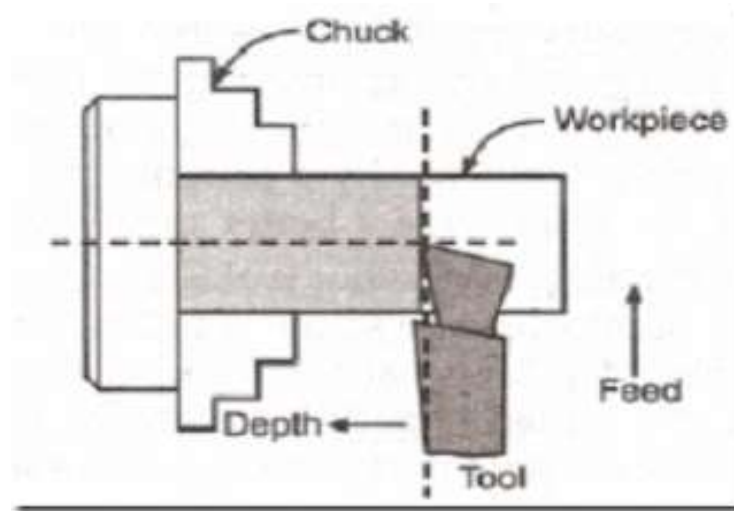
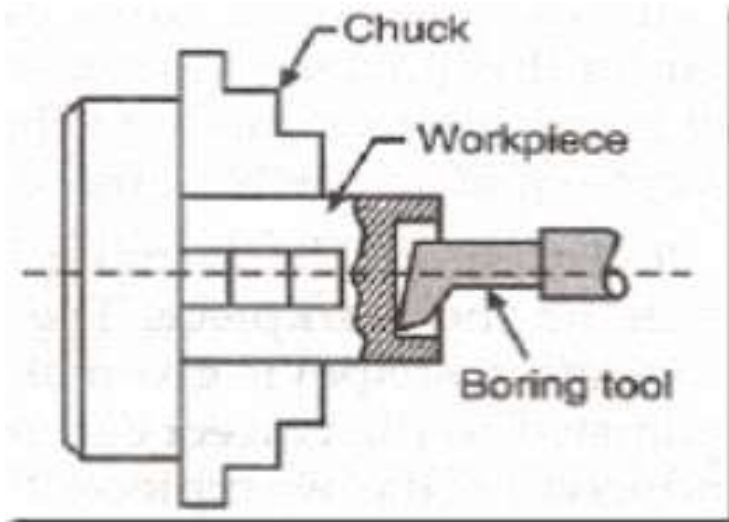
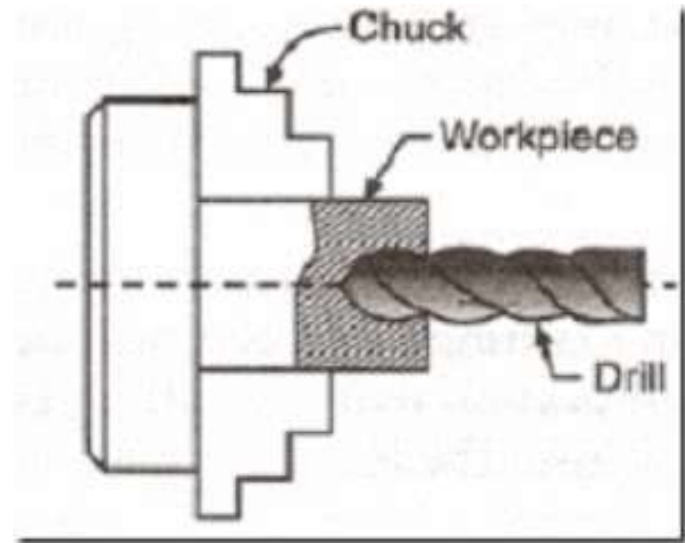


Fig. 7.17. Knurling

8. Knurling:--The process of embossing a diamond shaped regular pattern on the surface of the workpiece using a tool called Knurling tool.



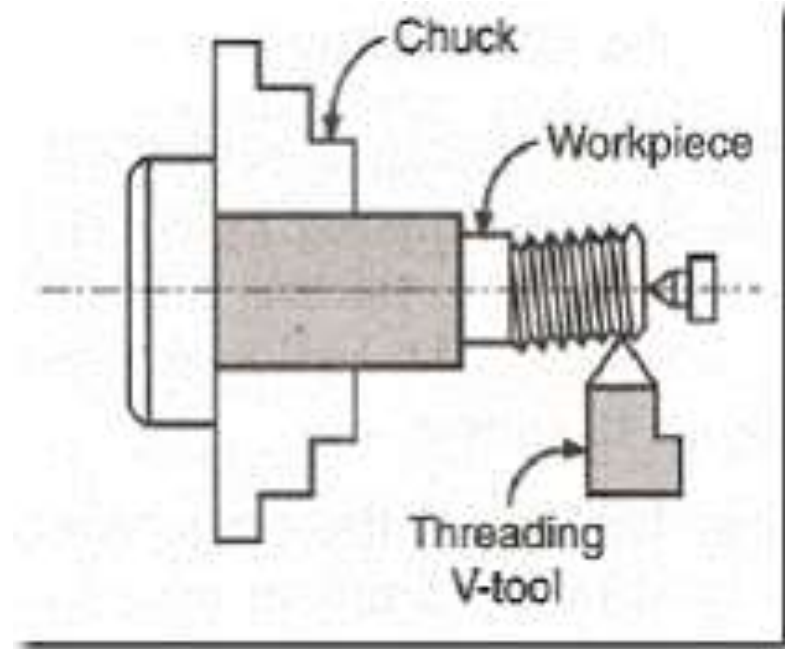
9.Drilling:--The process producing a cylindrical hole in the workpiece.



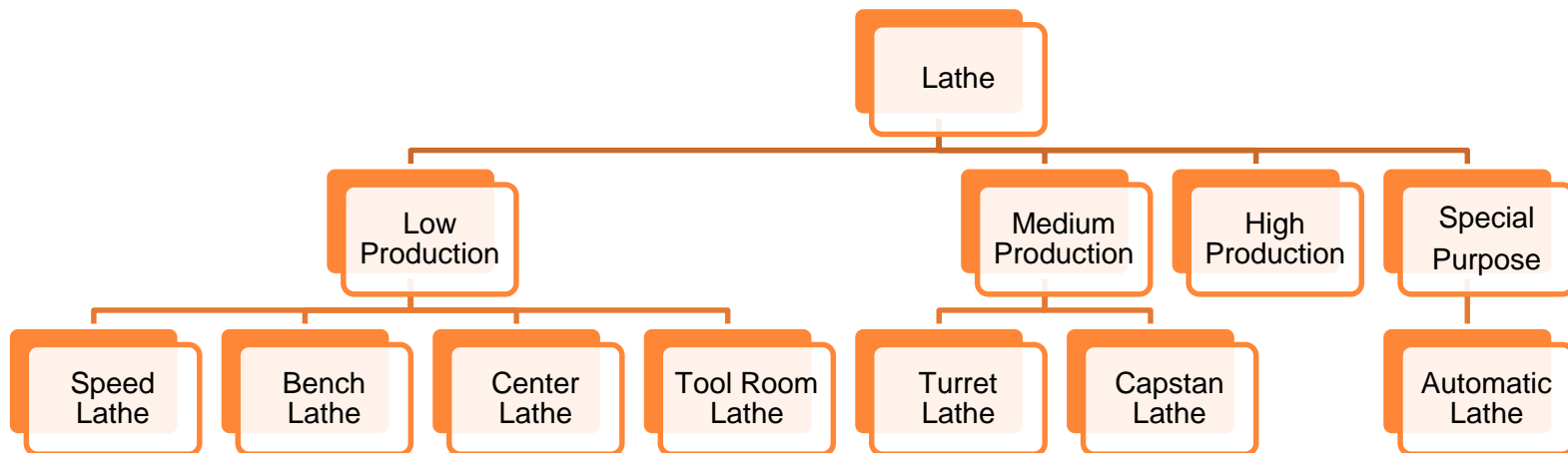
10.Boring:--The process of enlarging the already existing hole in the workpiece.



11.Thread
Cutting:-- the
process of
producing a helical
groove of "V" or
"square" shape on a
cylindrical surface.



TYPES OF LATHE MACHINE





Bench Lathe



Center Lathe



CNC Lathe



Lathe



MILLING MACHINE



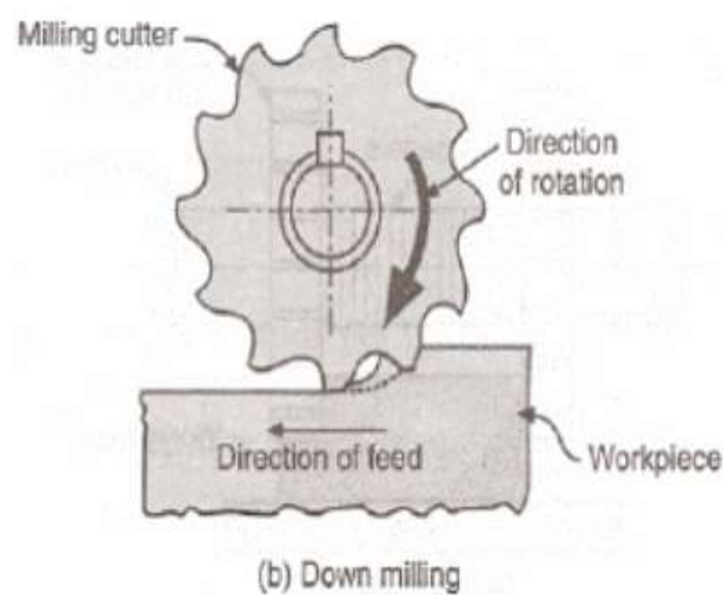
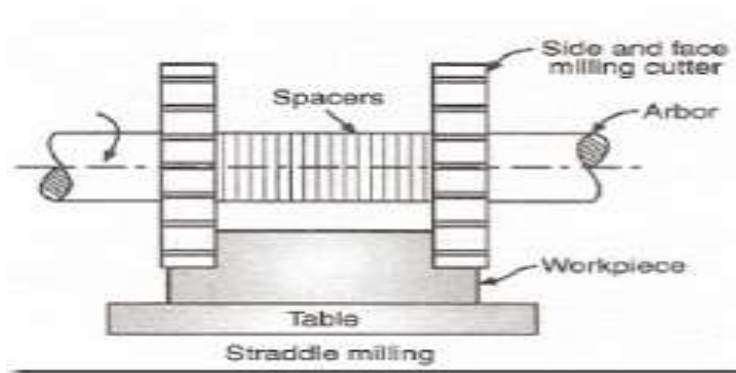
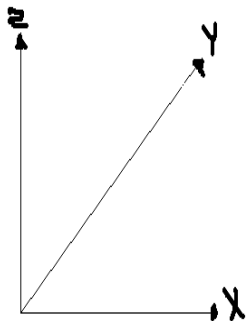
MILLING MACHINE

- Milling Machine is a machine tool used for removing the undesirable material from a workpiece by feeding the workpiece past a rotating multipoint cutting Tool is called "MILLING CUTTIER".





PRINCIPLES OF OPERATION OF MILLING MACHINE



BASIC ELEMENTS OF MILLING MACHINE

1. Base
2. Column
3. Knee
4. Saddle
5. Table
6. Over -Arm
7. Spindle
8. Arbor

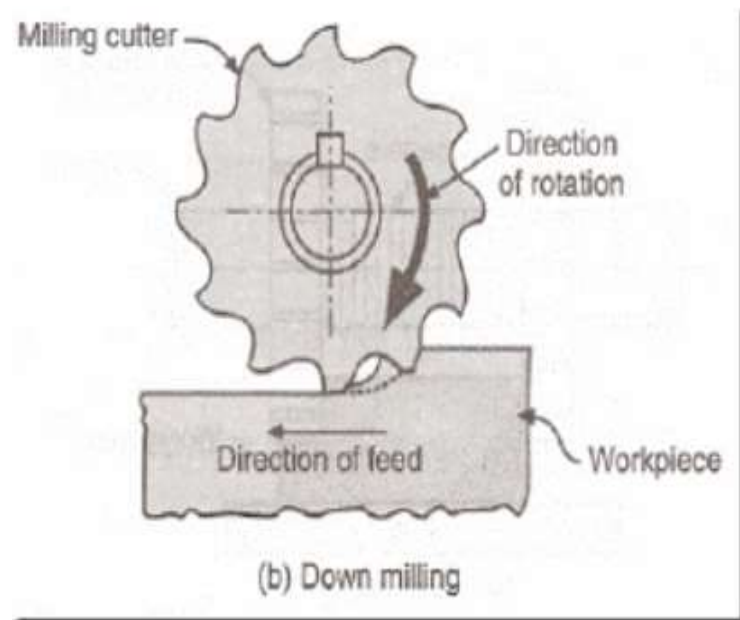
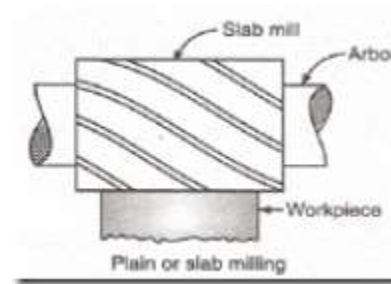


TYPES OF OPERATIONS PERFORMED ON MILLING MACHINE

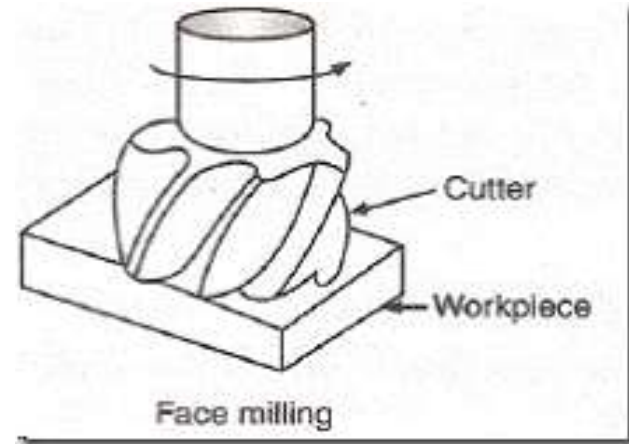
1. Plain milling:-- It is done by the cutter teeth located on the cylindrical surface of the cutter, as shown in fig.

There are two methods:-

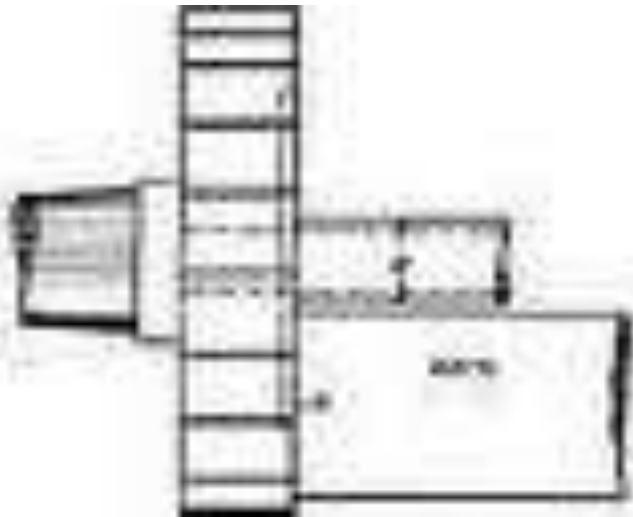
1. Up Milling
2. Down Milling



2.Face Milling:--It is done by the cutter teeth located on the flat end of the cylindrical cutter, as shown in the fig.



3.Side Milling:--It is done by the cutter teeth located on the flat surface of the cylindrical cutter, as shown in the fig.

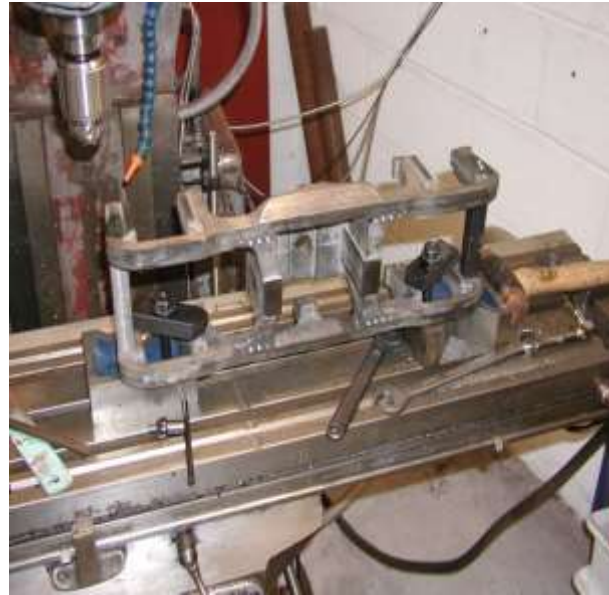


4.Side & Face

Milling:--It is done by the cutter teeth located on the flat surface as well as cylindrical surface of the cutter, as shown in both fig.



Pictures of Side
& Face Milling



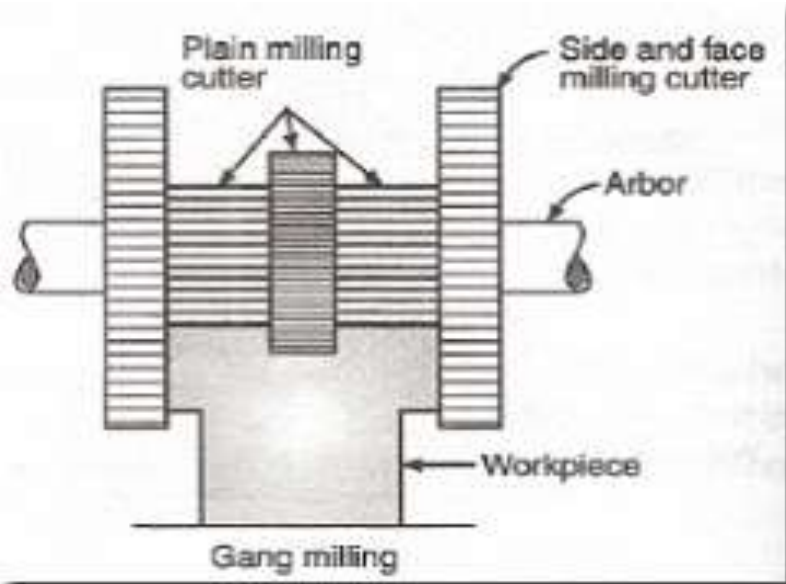
5. End Milling:--It is done by the cutter teeth on the end as well as the periphery of the cutter as shown in fig



Photo-4. You'll only offset the ballstock end, not the headstock end.

6. Gang Milling:--

Two or more milling cutters are mounted on an arbor so that each cutter will produce its own distinctive surface as the workpiece is fed to it, as shown in fig.



7.Profile (Form)

Milling:--The cutter with a curved teeth having outline same asd that of the shape of profile to be cut is used.

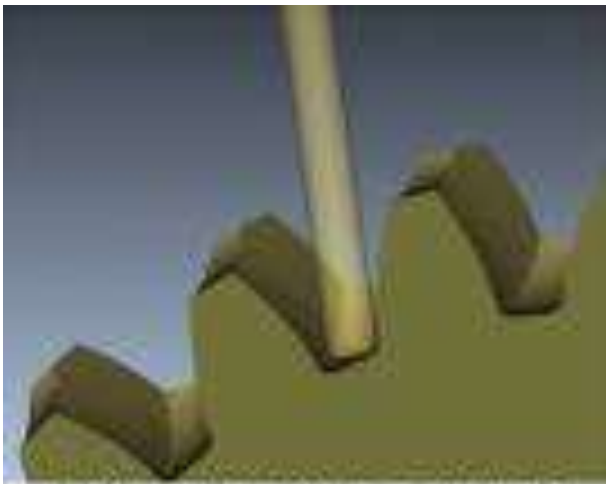
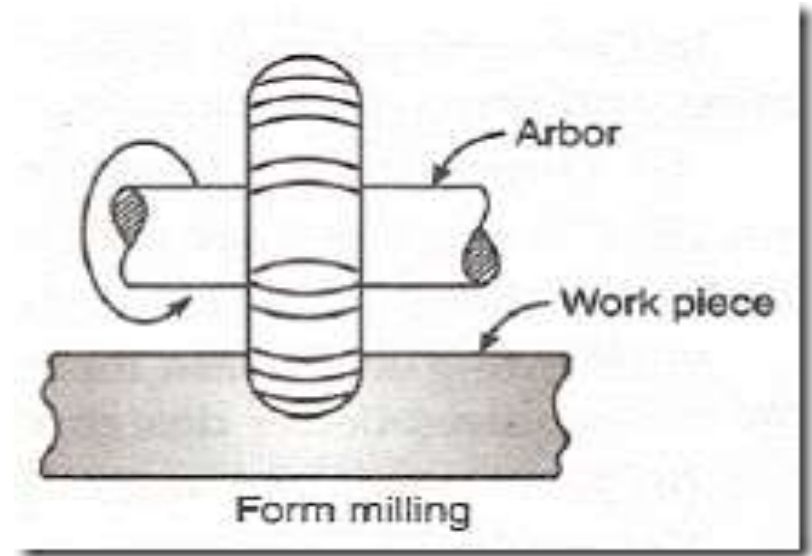


Figure 7.10 Form milling of a gear. Indicated effect of cutter corner radius on final gear form.

Pictures of the
profile Milling



8.Saw (Slitting)

Milling:--Thin Milling cutter is used for cutting deep narrow slots or for cutting off operations as shown in fig.



9.Keyway Milling:-

- The Keyways of rectangular cross-section are milled either on Horizontal or Vertical Milling Machine.



TYPES OF MILLING MACHINE



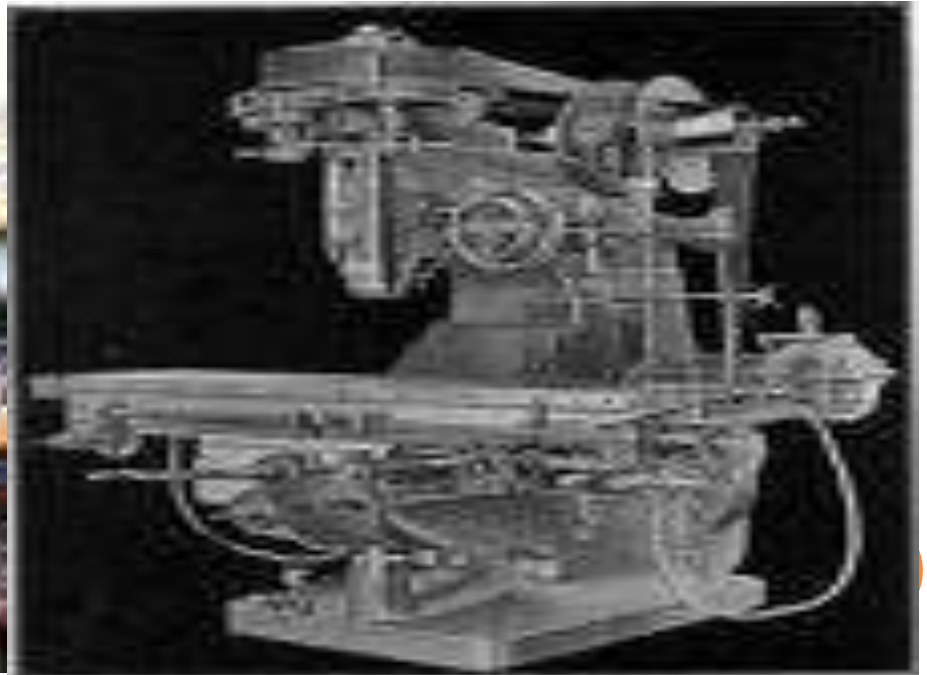




CNC Milling
Machine



Horizontal Milling



Vertical Milling

NC MACHINES



NC MACHINES

❖ NC – Numerical control machine tools.

❖ NC can be defined as the programmable automation in which the process is controlled by: numbers, letters and symbols.

The NC programme consists of a set of instructions or statements for controlling the motion of the drives as well as the motion of the cutting tools.

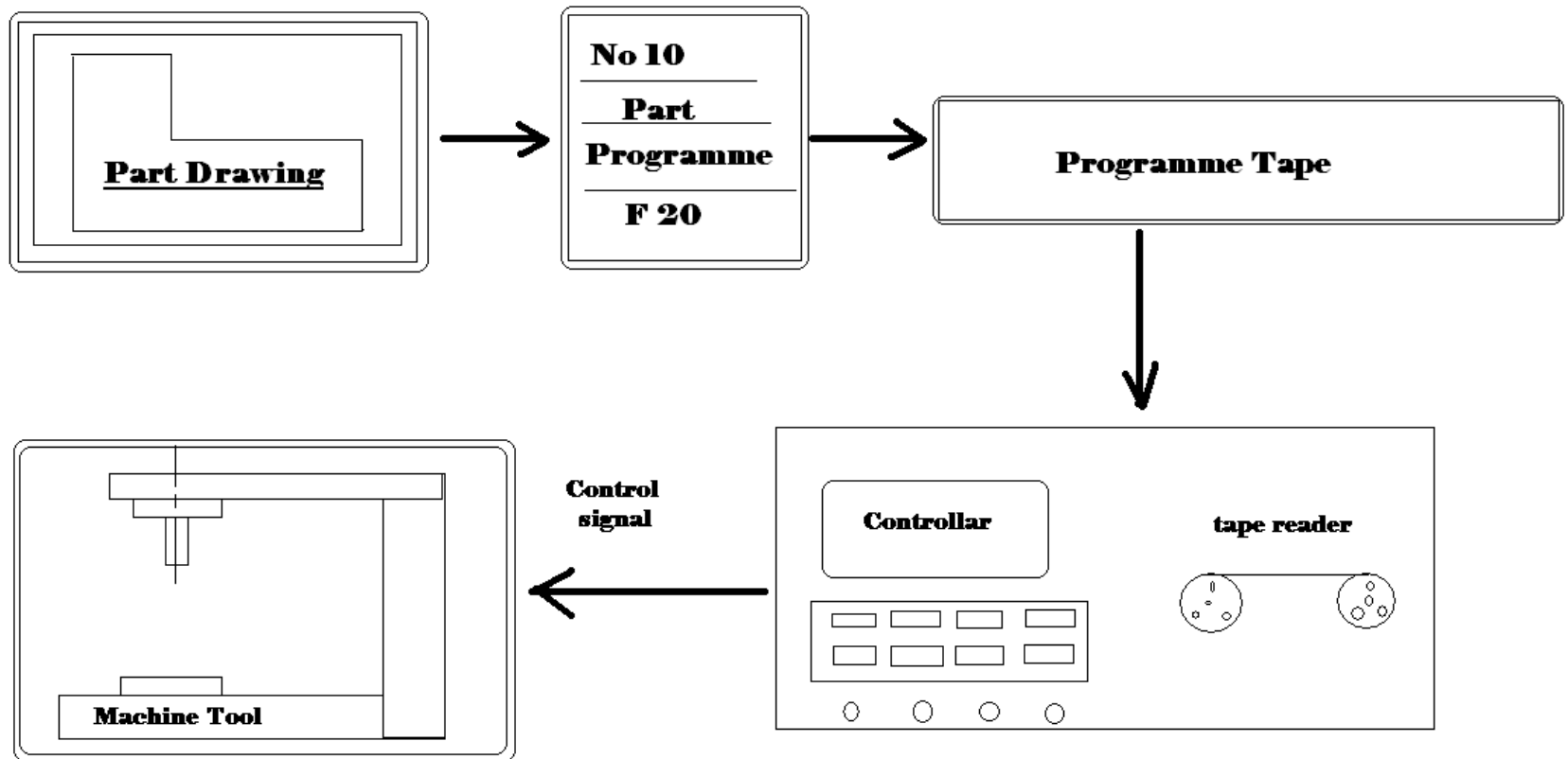


Images of NC Machine

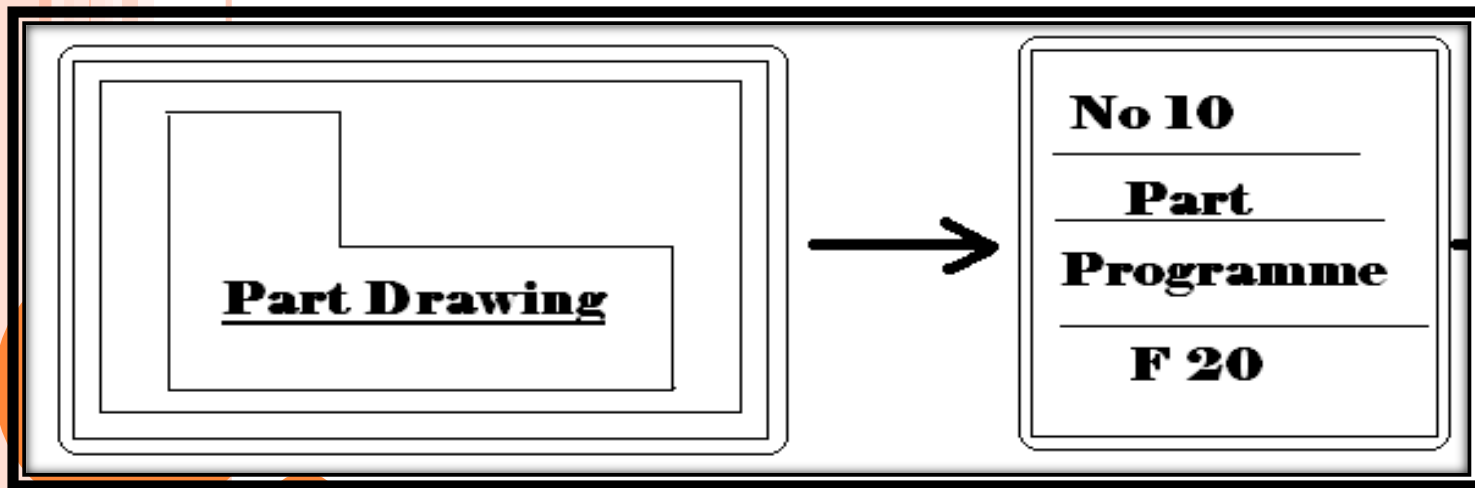


BASIC ELEMENTS OF NC MACHINE

TOOLS



1. PART DRAWING AND PROGRAM



- ❖ It is set of step by step information.
- ❖ It includes instructions.

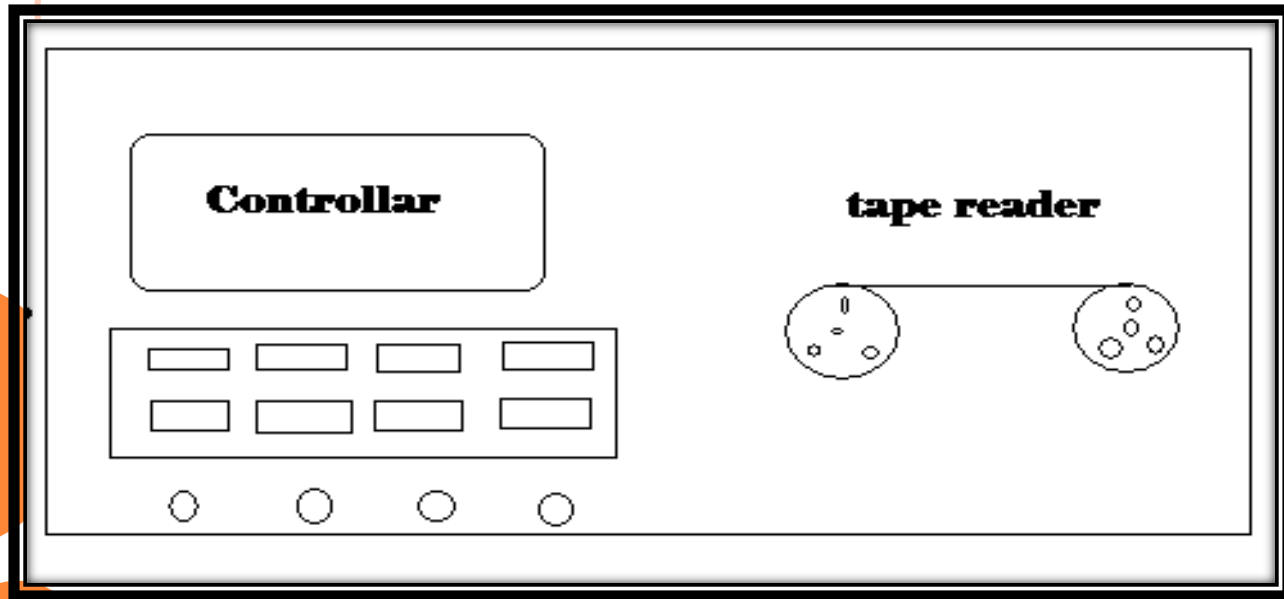
2. PROGRAMME TAPE



Part program is entered onto it .

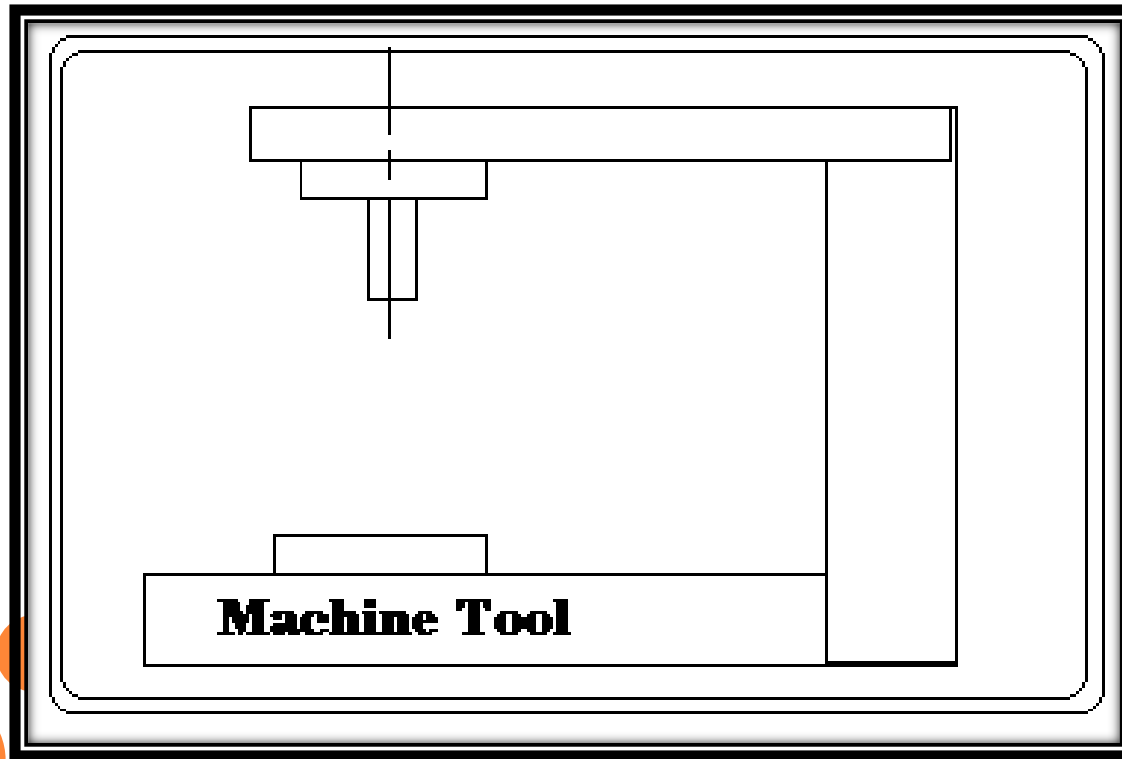
❖ *eg: paper tape, magnetic tape,
magnetic disk.*

3. MACHINE CONTROL UNIT (MCU)



- ❖ Program tape is read by tape reader.
- ❖ Controller takes input from tape reader.

4. MACHINE TOOL



- ❖ The machine tool is operated by the controller of MCU.

APPLICATIONS OF NC MACHINE TOOLS

■ AREAS OF APPLICATIONS:

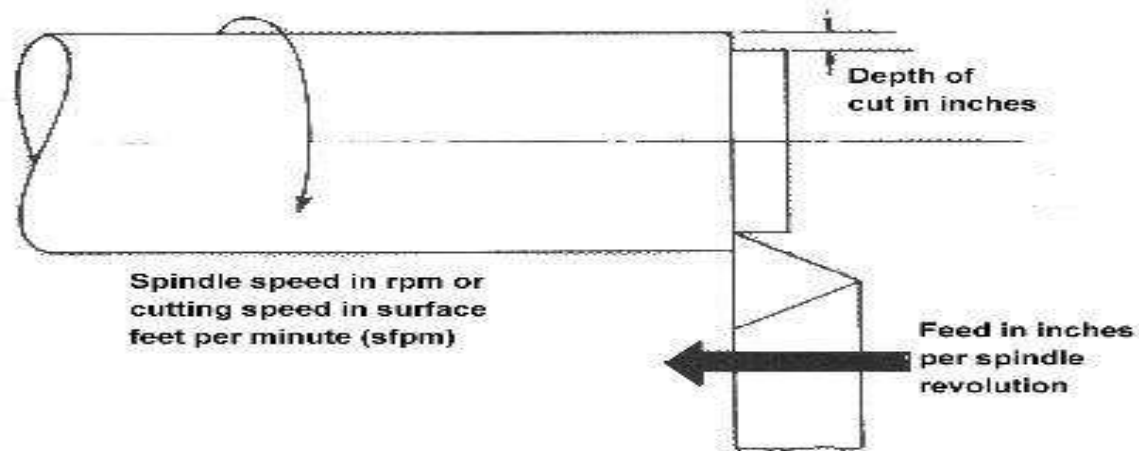
- ❖ Machining complex shaped components.
- ❖ Machining precision quality components.
- ❖ Machining components which frequently change design.
- ❖ Machining components where sequence of operation is complex and operator may make mistakes.
- ❖ In manufacturing process, where there is need to reduce non-productive time of production.
- ❖ In applications , where work-piece is expensive and rejection is costly.
- ❖ Manufacturing critical components which require 100% inspection.

NC MACHINE TOOLS COVER WIDE RANGE OF APPLICATIONS:

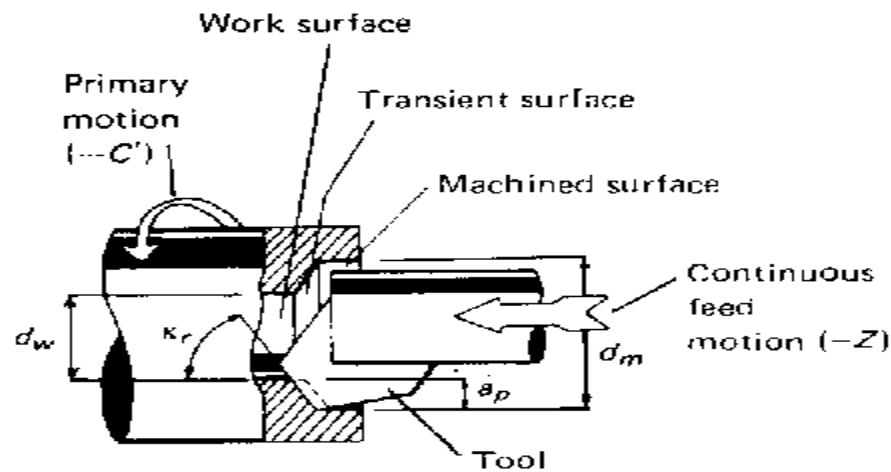
- Examples of NC machine tools are:

- NC Lathe and turning center.
- NC Milling , Boring , Drilling machine.
- NC Welding and Arc cutting machine.
- NC Punching press
- NC Pipe bending machine.
- NC Grinding machine.





Turning and the adjustable parameters



TURNING & BORING NC MACHINE TOOLS

ADVANTAGES OF NC MACHINE TOOLS

- ❖ Greater Machine use.
- ❖ Complex Machining Operations.
- ❖ High degree of Accuracy.
- ❖ Less Inspection required.
- ❖ Reduction of Scrape and Wastage.
- ❖ Reduced Lead Time for Production.



- ❖ Greater operator Efficiency.
- ❖ Greater Machine Tool Safety.
- ❖ Reduced space Requirements.
- ❖ Greater Operator Safety.
- ❖ Increased Productivity.
- ❖ Lower tooling cost.
- ❖ Reduction of Human Error.



LIMITATIONS OF NC MACHINE TOOLS

- ❖ High initial cost.
- ❖ High maintenance cost.
- ❖ Requirement of highly skilled man power.
- ❖ High tooling cost.
- ❖ Need for conditioned environment.



CNC MACHINES



CNC MACHINES.

- Computerised numerical control machine.
- A microcomputer or minicomputer is used as a machine control unit (MCU).
- Various functions are controlled by program entered through computer input devices like :key board and CD.





CNC MACHINE PICTURE







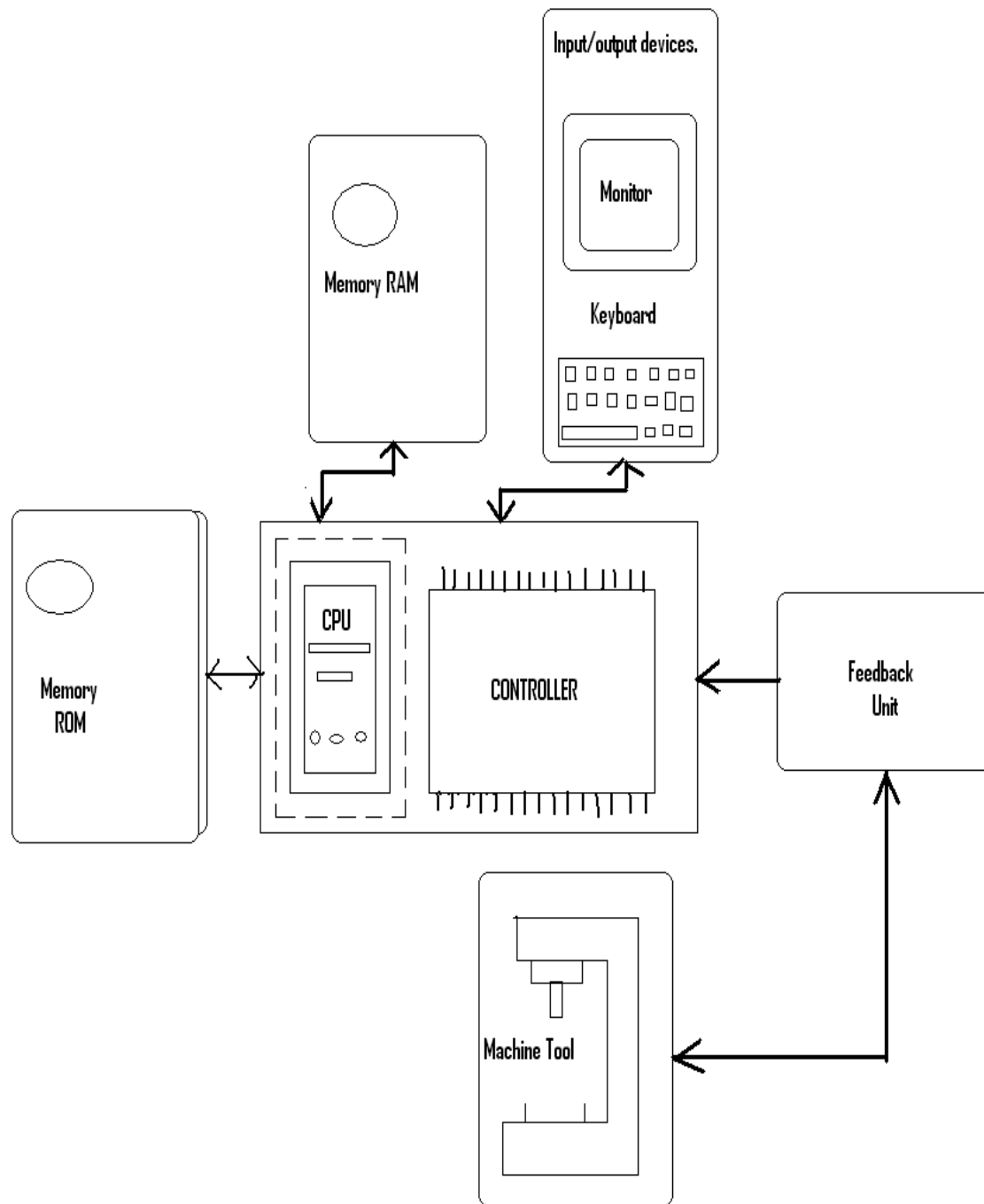
ACTUAL CNC MACHINE



BASIC ELEMENTS OF CNC MACHINE.

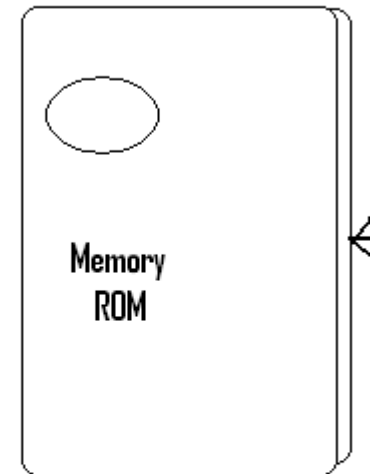
- Part drawing and part programme.
- Input or output devices .
- Memory devices (RAM and ROM).
- Computer based machine control unit.
- Machine tool.
- Feedback unit.





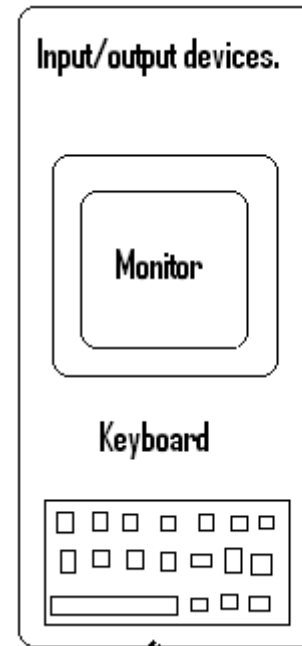
1.PART DRAWING AND PART PROGRAMME.

- ❖ Part programme is written using part drawing and the cutting process parameters.



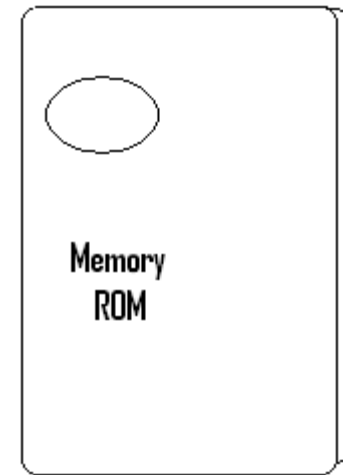
2.INPUT/OUTPUT DEVICES.

- Programme is entered into computer using input devices like
:mouse ,
keyboard, CD.



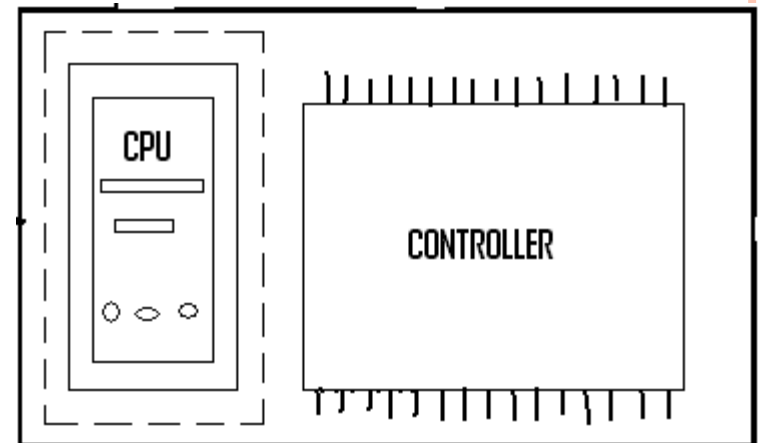
3. MEMORY DEVICES.

- Programme can be permanently stored on hard disk.
- It stores the programs and control program during the operation of the CNC machine tool.



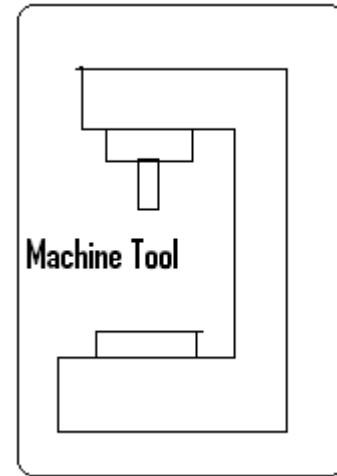
4. COMPUTER BASED MACHINE CONTROL UNIT.

- The program is read by the CPU of the computer.
- The controller takes input from the CPU of the computer and actuates the drives and tools of the machine tool.



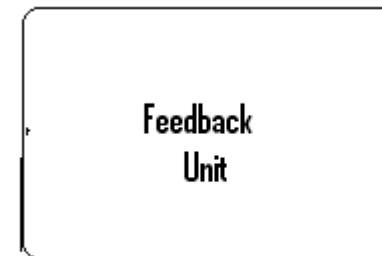
5. MACHINE TOOL.

- The machine tool is operated by the controller of the computer based machine control unit.
- The foll. Functions are automatic:
- Changing the tools
- Controlling the feed rate.
- Positioning the tool tip at the desired locations and guiding it along the desired path by automatic control of the slide motions.
- Controlling the spindle speed.



6.FEEDBACK UNIT.

- Feedback unit takes feedback from the machine tool and gives it to the computer based machine control unit.



ADVANTAGES OF CNC MACHINE TOOLS.

- ❖ Part program once entered can be used again and again.
- ❖ Part program can be edited or modified.
- ❖ Writing of additional repetitive program can be minimised by use of macros. This saves time and money.
- ❖ CNC Machines have an additional facility of program listing simulation which can be displayed on the system screen.
- ❖ CNC controllers allow compensation for any change in cutting tool dimension.



LIMITATIONS OF CNC MACHINE TOOLS.

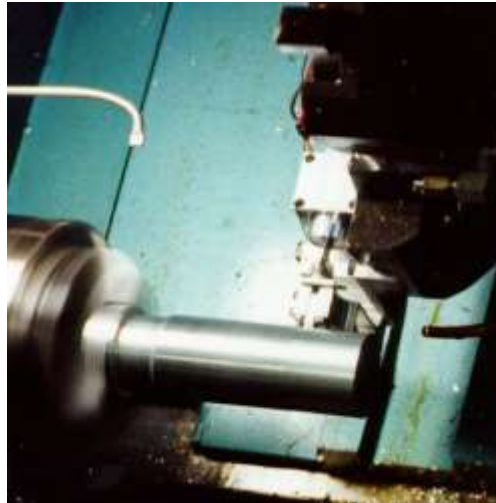
- ❖ High initial cost .
- ❖ High maintenance cost.
- ❖ Requirement of highly skilled man-power.
- ❖ High tooling cost.
- ❖ Need for conditional environment.



APPLICATIONS OF CNC MACHINE TOOL.

- CNC turning centre.
- CNC machining centre.
- CNC welding and cutting machines.
- CNC laser cutting machine .
- CNC wire-cut EDM (Electrical discharge machining) centre.
- CNC Die-Casting machine
- CNC disc Grinder.
- CNC Gear Shaper.





Here is a picture of the actuator in operation.

The material being cut is an aluminum alloy.

The actuator/flexor system is mounted to the tool holder turret of MTU's CNC lathe.



<i>Sr No</i>	<i>Comparision parameter</i>	<i>NC Machine tools</i>	<i>CNC Machine tools</i>
1.	Mode of operation	Part program is entered on program tape	Part program is entered on computer
2.	MCU	Tape reader & controller form MCU	Computer & controller form MCU
3.	Capacity to store part programs	Only one part program can be stored	More than one part program can be stored
4.	Feed back unit	No feed back unit	Feedback unit
5.	Memory Storage Capacity	Less	More
6.	Reliability	Less	More
7.	CAD	Not required	required



THANK YOU



Any Questions?

