

WMP Lab Machine Shop

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Introduction

Machining :

- The process of removing material from a workpiece in the form of chips
- A machining process requires a cutting tool & a machine tools

Machining Processes

- Turning
- Milling
- Drilling
- Shaping / Planning
- Grinding

Basic functions of Machine Tools

Machine Tools basically produce geometrical surfaces like flat, cylindrical or any contour on the preformed blanks by machining work with the help of cutting tools.

The physical functions of a Machine Tool in machining are:

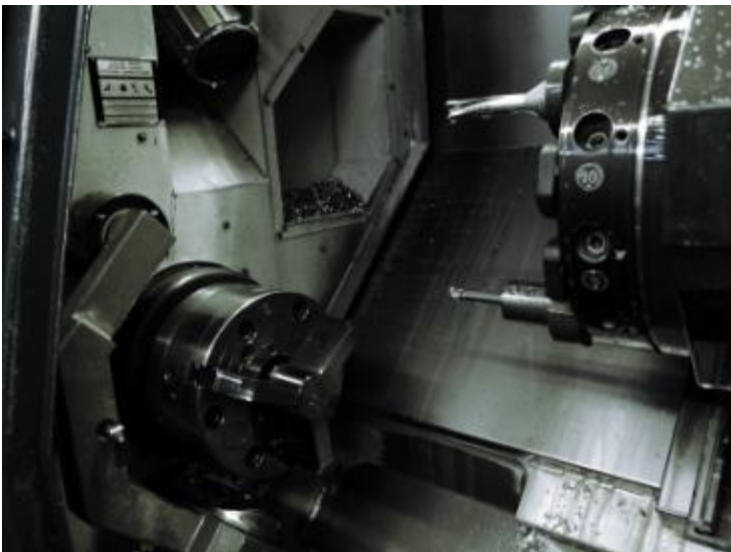
- Firmly holding the blank and the tool
- Transmit motions to the tool and the blank
- Provide power to the tool-work pair for the machining action.
- Control of the machining parameters, i.e., speed, feed and depth of cut.

Machining Processes

Turning Processes

Lathes and turning centers:

Processes include: **Straight, taper, contour turning, facing, forming, necking, parting, boring, threading, and knurling**



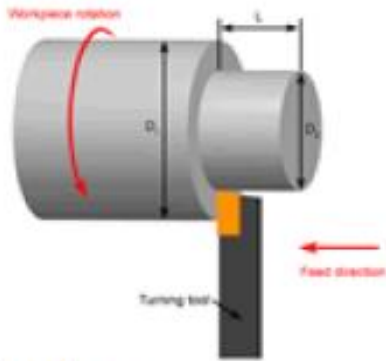
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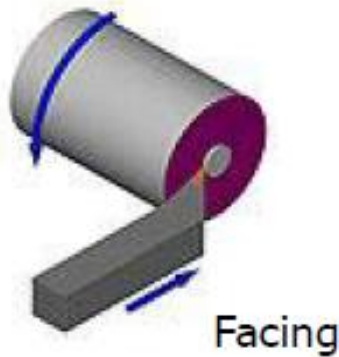
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Turning

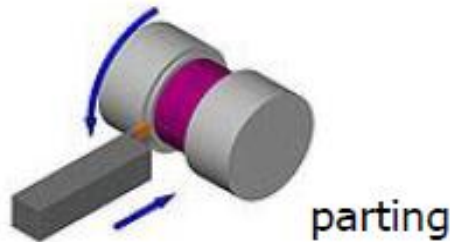
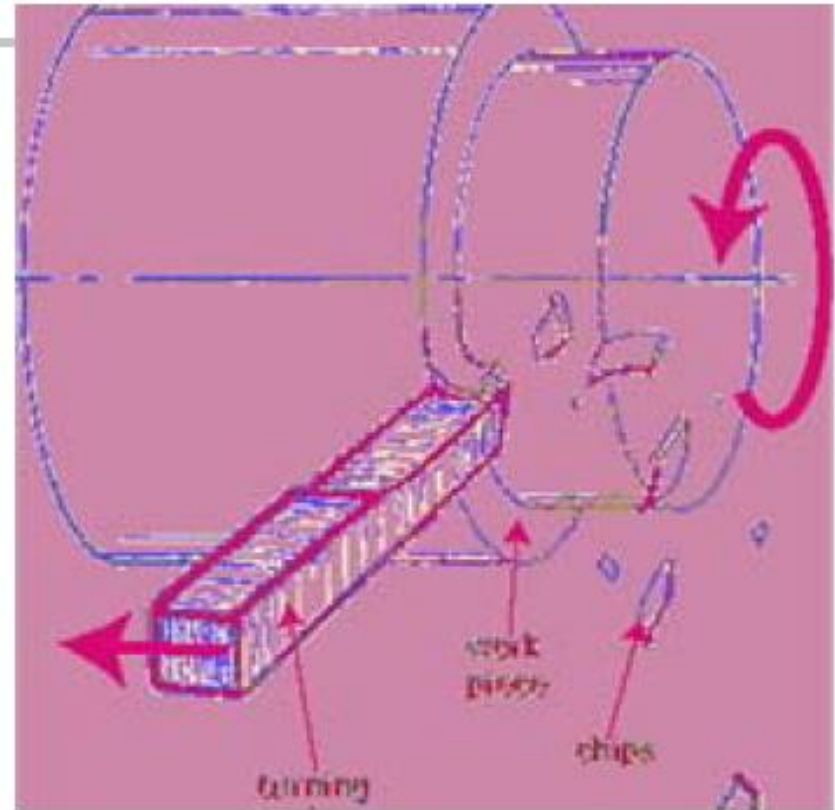
Turning is performed on a lathe machine



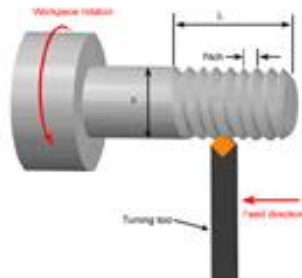
Turning



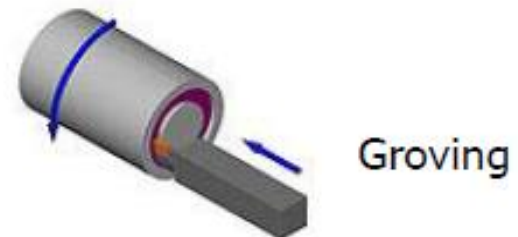
Facing



parting



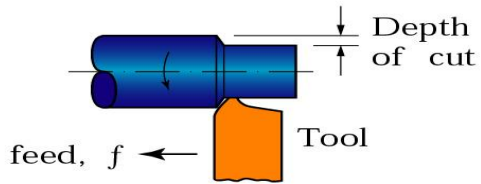
Threading



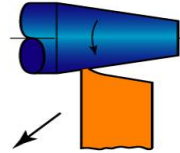
Grooving

Lathe Operations

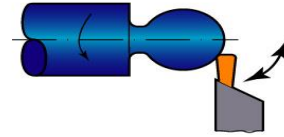
(a) Straight turning



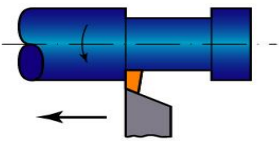
(b) Taper turning



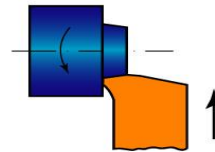
(c) Profiling



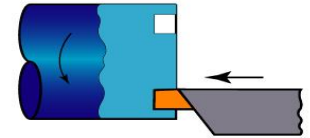
(d) Turning and external grooving



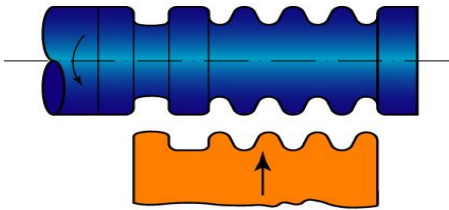
(e) Facing



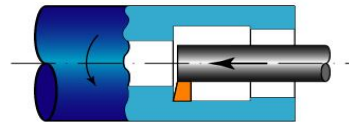
(f) Face grooving



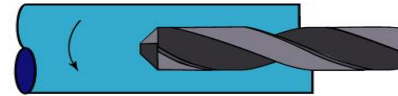
(g) Cutting with a form tool



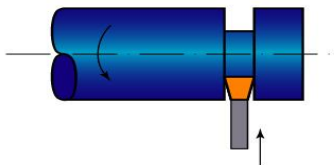
(h) Boring and internal grooving



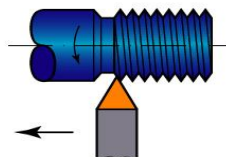
(i) Drilling



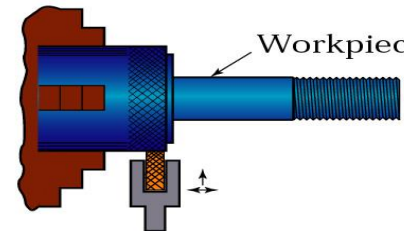
(j) Cutting off



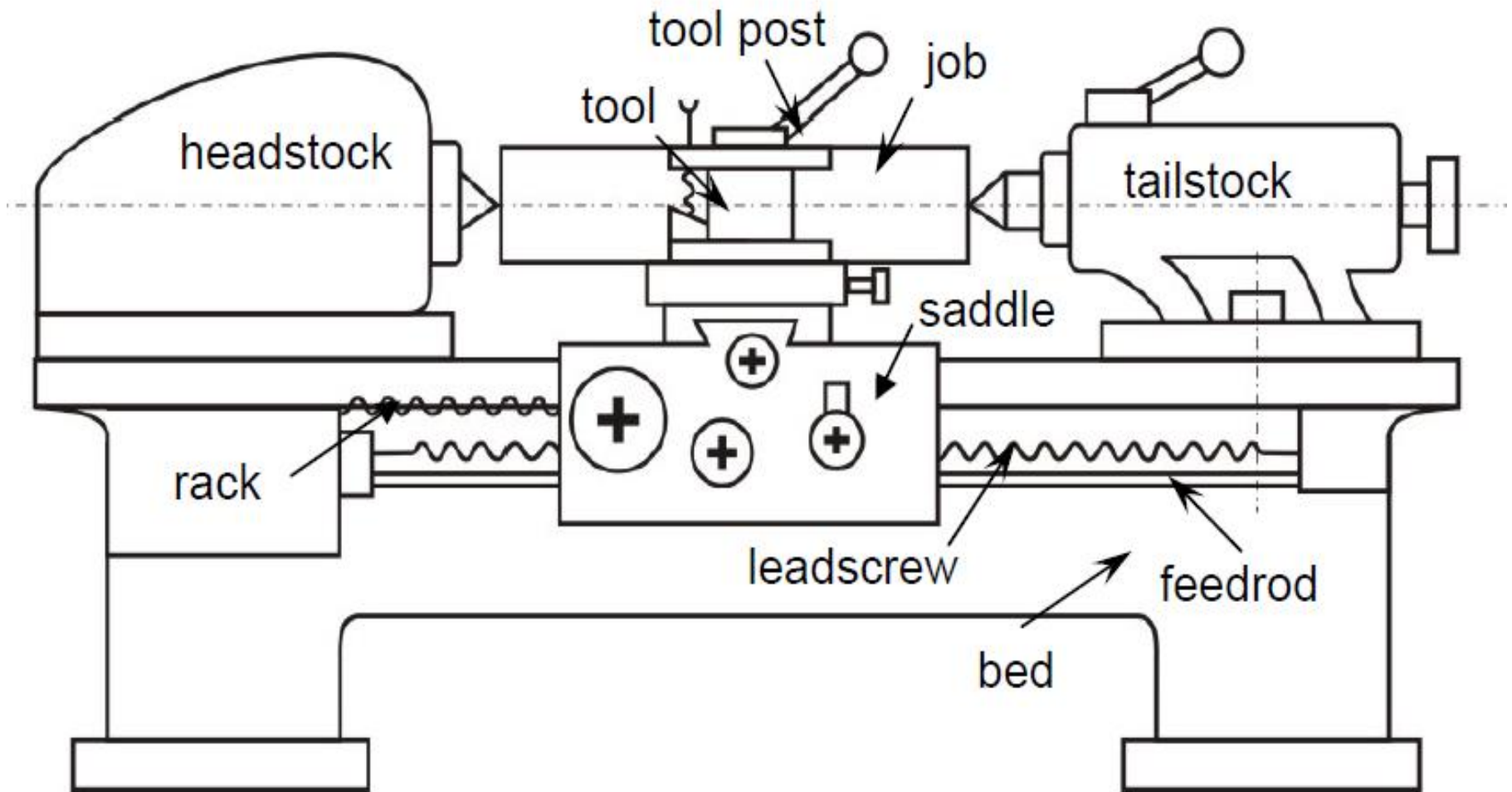
(k) Threading

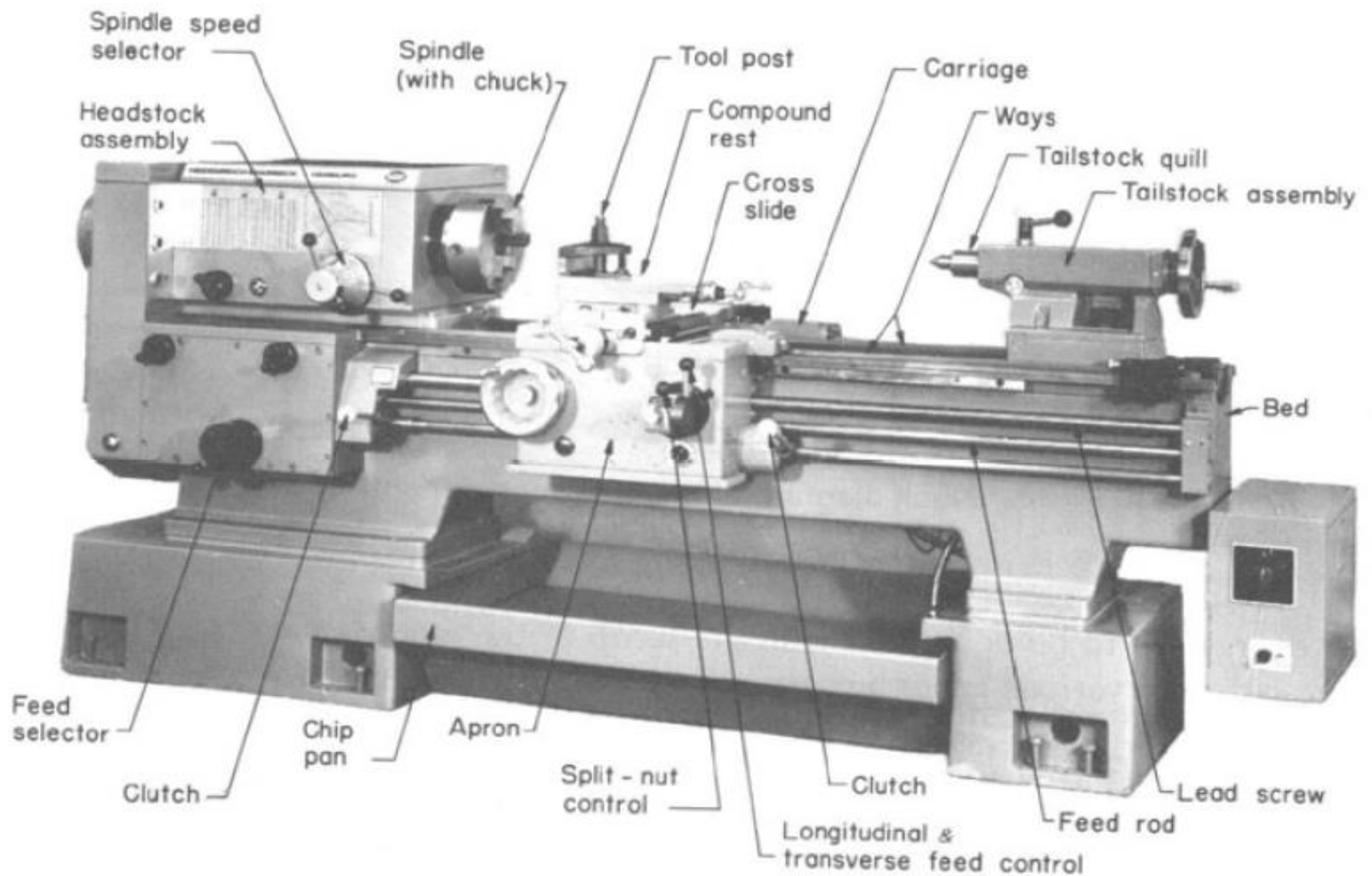


(l) Knurling



Layout of lathe m/c tool





Parts of a Lathe Machine

A CNC Lathe Machine

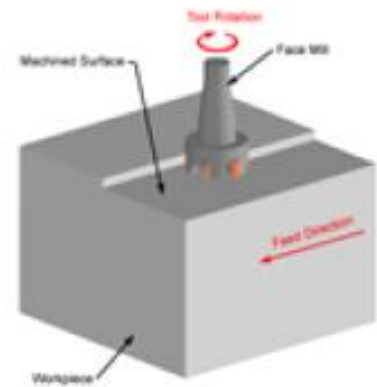
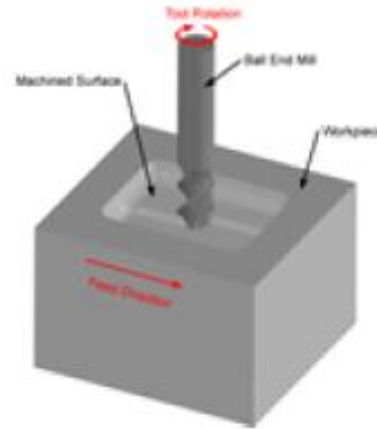


Milling

- Milling is a widely-used for producing slots



Reaming



Face milling



Machining Processes

Milling Processes

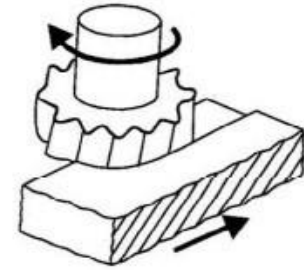
Mills – Vertical and horizontal

Processes include: Surfacing, shaping, forming, slotting, T-slotting, angle, straddle, dovetailing, and slab milling

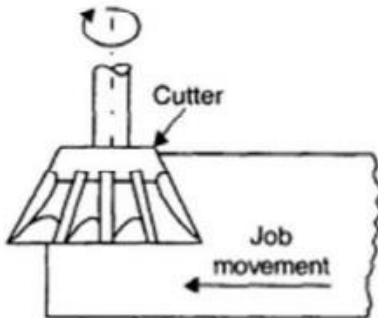
Operations carried out on the milling machine are:

Plain or Slab Milling: The plain milling operation is the production of flat or horizontal surface parallel to the axis of the cutter.

Face Milling: The face milling operation is also the production of flat surface which is at right angle to the axis of rotation of the face milling cutter.



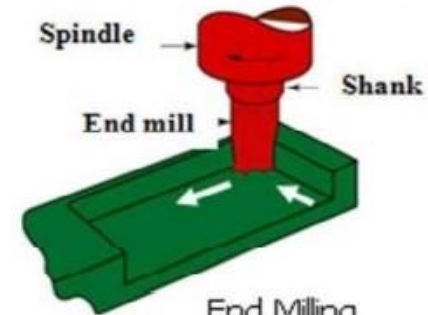
Face milling



Angular or Bevel Milling

Angular or Bevel Milling: The angular milling operation is production of flat surface, which is at an angle to the axis of the cutter.

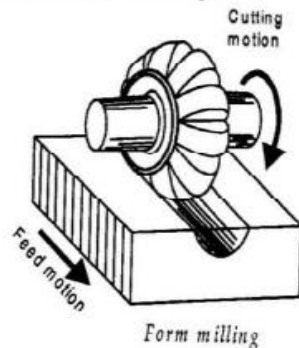
Side Milling: The side milling operation is the production of a vertical flat surface on the side face of a job by using a side milling cutter.



End Milling

End Milling: The End milling operation is the production of **both peripheral and face milling** operations simultaneously, generates vertical, horizontal or angular surfaces by using an end milling cutter.

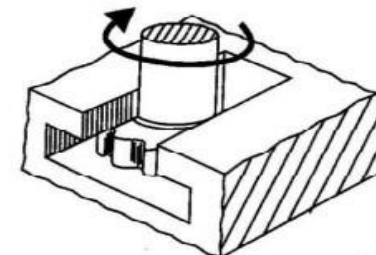
Gang Milling: Gang milling is operation production of producing many surfaces of a job simultaneously by feeding the table against a number of required cutters, (more than two). The surfaces produced may be flat horizontal or vertical surfaces and are produced simultaneously.



Form milling

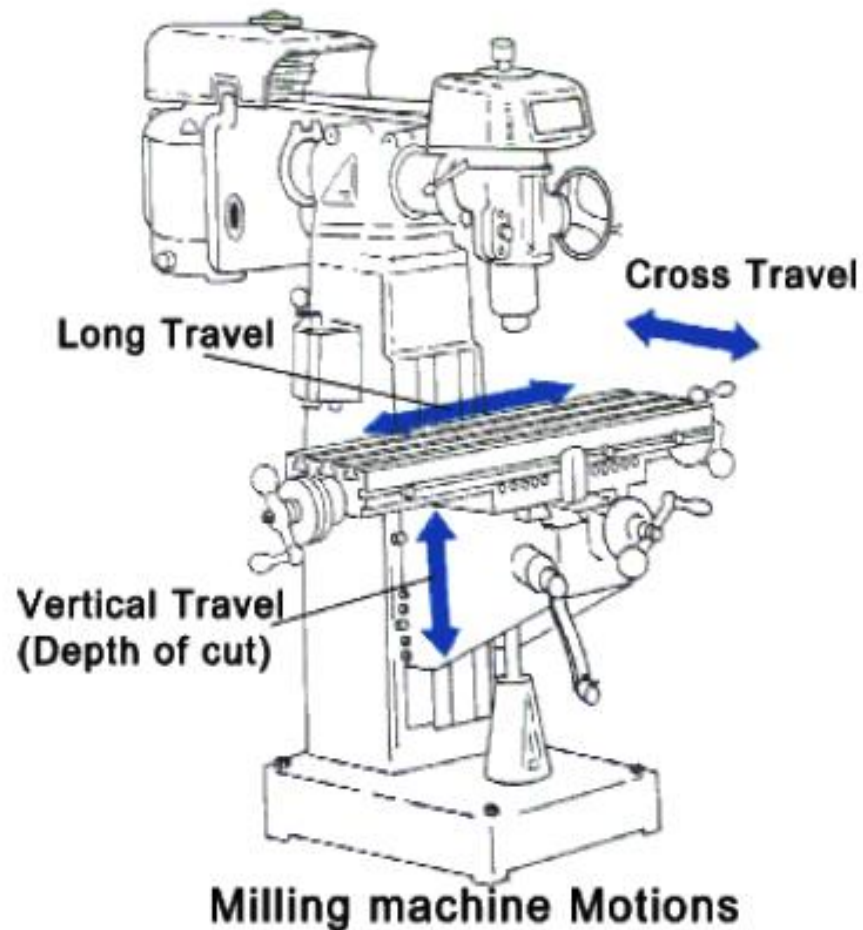
Form Milling: The form milling operation is the production of irregular contours by using the cutters having the same profile corresponding to the surface to be generated.

T-Slot milling refers to the formation of T-Slots.



T- Slot milling

A SIMPLE MILLING MACHINE

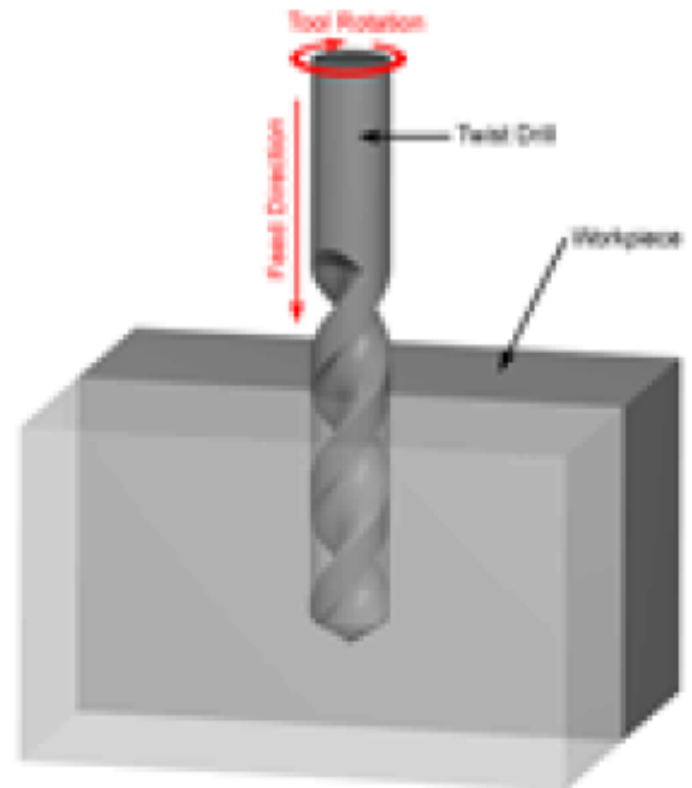
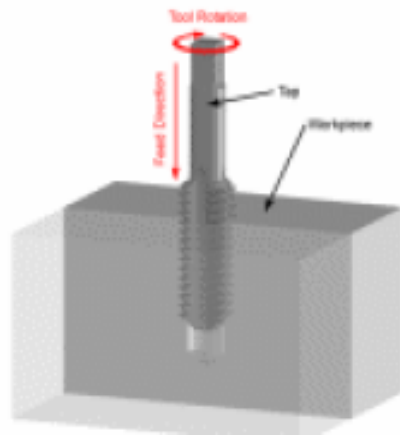


CNC Milling Machine



Drilling

Drilling is a process used to produce holes inside solid parts.



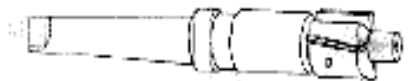
A SIMPLE DRILL MACHINE



STRAIGHT SHANK DRILL



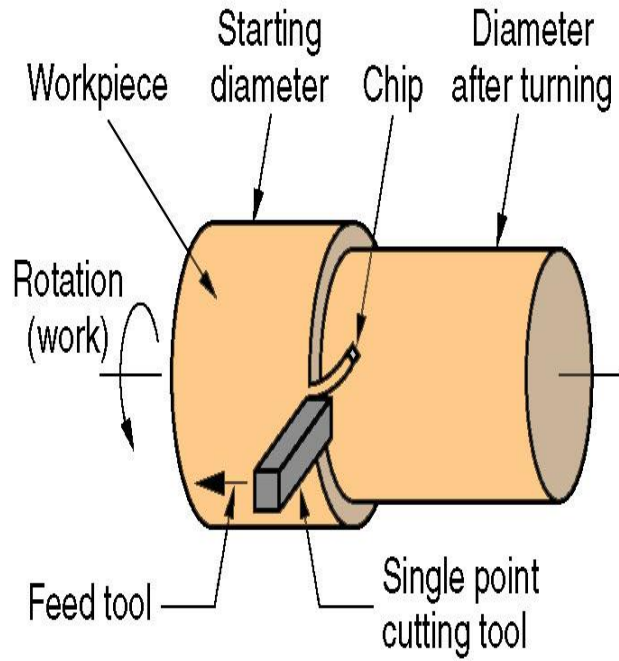
TAPER SHANK DRILL



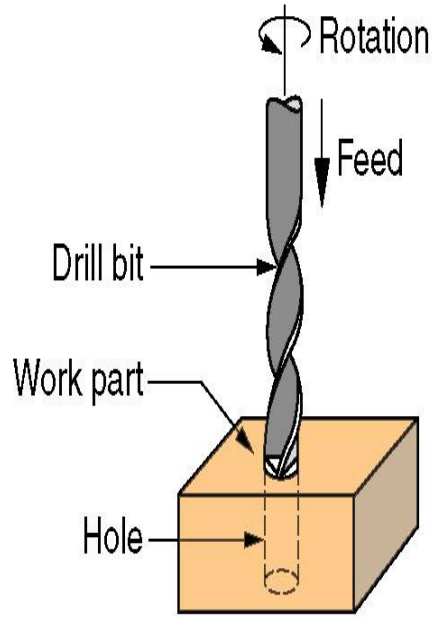
SPOT FACE DRILL



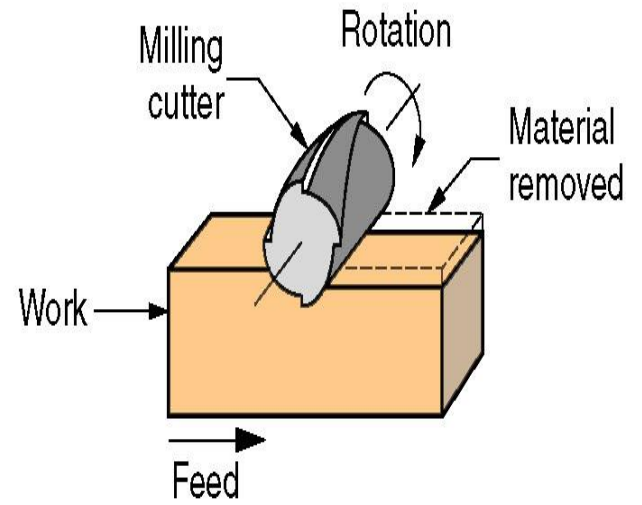
CENTER DRILL



(a)



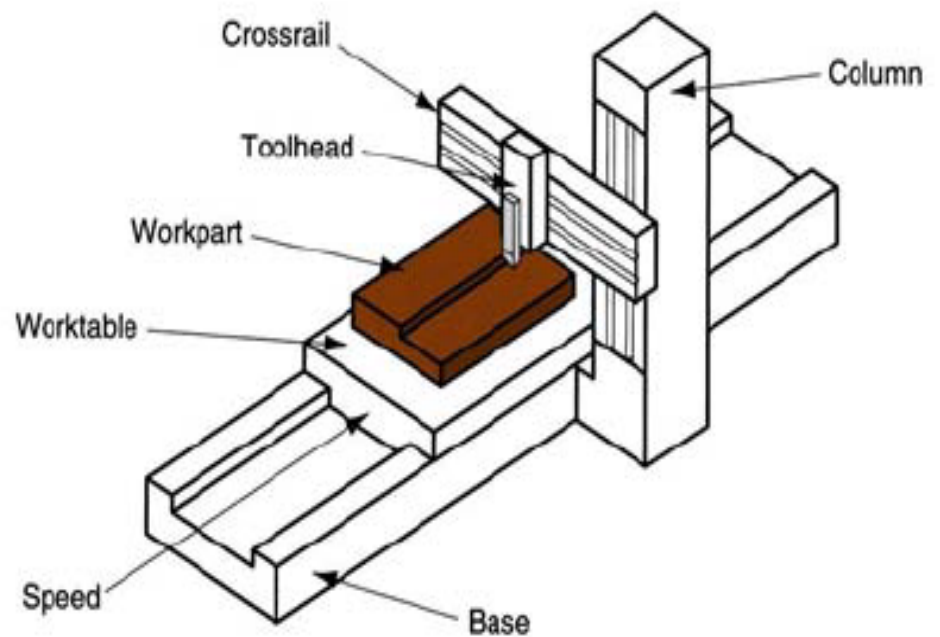
(b)



(c)

Shaping Machine

Shaping is used to produce surfaces.



Grinding



Grinding Wheel

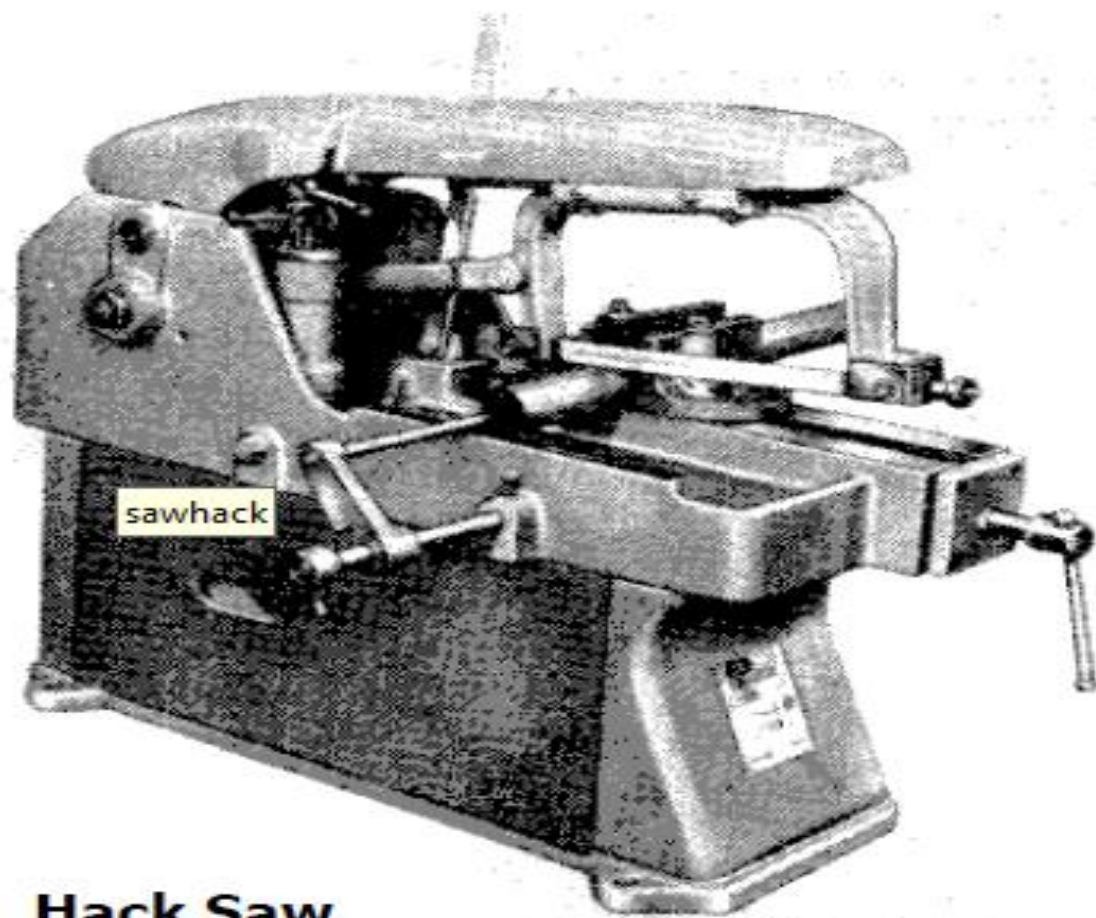


Surface Grinding

Surface Grinder



Sawing Machines



Hack Saw

Band Saw

References

- Manufacturing Technology (Volume-2) by P N Rao, Tata McGraw Hill, New Delhi
- 'Production Technology' by R K Jain, Laxmi Publisher
- Workshop Technology by Hajara Choudhary
- Ghosh A. and Mallik A. K., Manufacturing Science, EWP Pvt. Ltd

THANK YOU