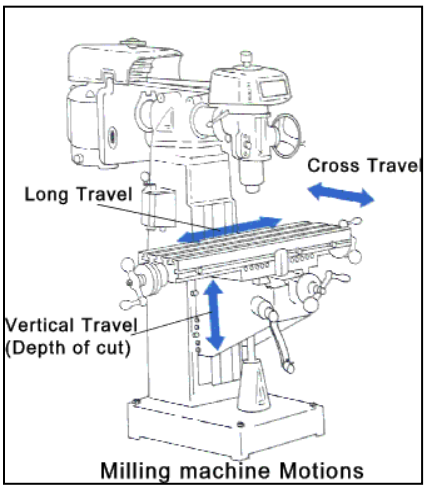
Introduction to Milling Machine and perform face milling to calculate Machining time.

Apparatus:

Milling Machine, Aluminum slab, end mill cutter.

Figure



Milling Machine

Milling is a machining operation in which a work part is fed past a rotating cylindrical tool with multiple cutting edges). (In rare cases, a tool with one cutting edge, called a fly-cutter, is used). The axis of rotation of the cutting tool is perpendicular to the direction of feed. This orientation between the tool axis and the feed direction is one of the features that distinguish milling from drilling.

TYPES OF MILLING OPERATIONS

There are two basic types of milling operations
(1) Peripheral
(2) Face milling.

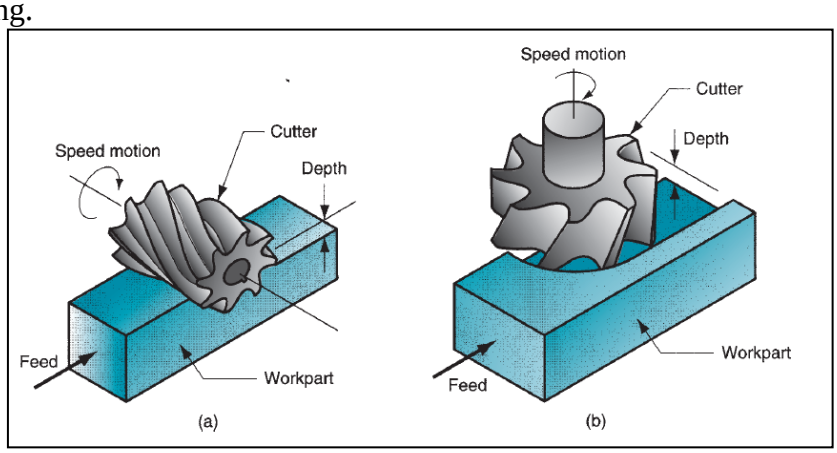


Fig: (a) Peripheral or plain milling (b) Face milling

Peripheral Milling

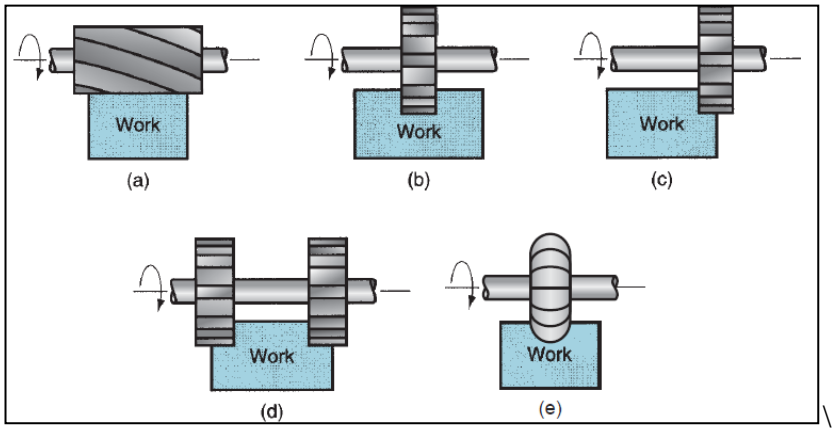
Peripheral Milling In peripheral milling, also called plain milling, the axis of the tool is parallel to the surface being machined, and the operation is performed by cutting edges on the outside periphery of the cutter. Several types of peripheral milling are

(a) slab milling, slab milling the basic form of peripheral milling in which the cutter Width extends beyond the workpiece on both sides

(**b) slotting,** also called slot milling, in which the width of the cutter is less than the workpiece width, creating a slot in the Work when the cutter is very thin, this operation can be used to mill narrow slots or cut a work part in two, called saw milling

(**c) side milling**, in which the cutter machines the side of the workpiece

(**d) straddle milling,** the same as side milling, only cutting takes place on both sides of the work; and form milling, in which the milling teeth have a



Face Milling

In face milling, the axis of the cutter is perpendicular to the surface being milled, and machining is performed by cutting edges on both the end and outside periphery of the cutter.

(a) conventional face milling, in which the diameter of the cutter is greater than the work part width, so the cutter overhangs the work on both sides.

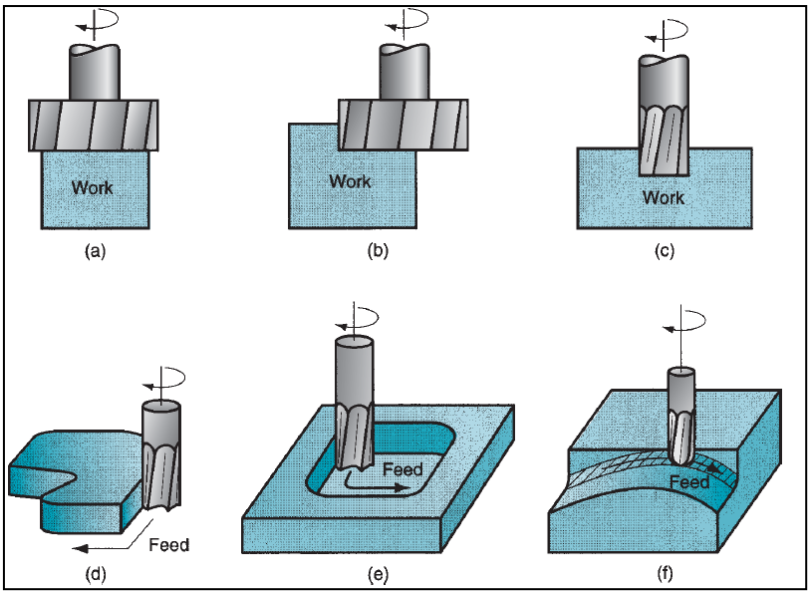
(**b) partial face milling**, where the cutter overhangs the work on only one side

(c) end milling, in which the cutter diameter is less than the work width, so a slot is cut into the part

(**d) profile milling,** a form of end milling in which the outside periphery of a flat part is cut

(e) pocket milling, another form of end milling used to mill shallow pockets into flat parts

(f) surface contouring, in which a ball-nose cutter (rather than square-end cutter) is fed back and forth across the work along a curvilinear path at close intervals to create a three-dimensional surface form



Procedure

- Give one complete rotation longitudinal lever and note time
- Give depth of cut to in vertical axis
- Calculate feed rate
- Calculate actual machining time for simple facing time

Observations and calculations

Length of Workpiece=L=
Width of Workpiece=W=
No. of Teeth=n_t =
Approach and over travel lengths=Lc=L_o+L_a=
Diameter of tool=D=

Sr. No	RPM of tool (N)	Cutting speed Vs=πDN	Feed Rate F_r=F x n_t x N	Machining time $T_{theo}=\frac{L+LC}{F_r}$	Machining time(actual) T_{act}
		mm\mint	mm\mint	mint	mint
1.					
2.					
3.					

Graphs

1. Plot a relationship between RPM and Cutting Speed.
2. Plot a relationship between RPM and Feed Rate.
3. Plot a relationship between Cutting Speed and Feed Rate
4. Plot a relationship between Actual and Theoretical Machining Time.
5. Plot a relationship between Theoretical Machining Time and Feed Rate.
6. Plot a relationship between Actual Machining Time and Feed Rate.

Calculations

Questions

Differentiate between face milling and peripheral milling?

Write about different operations related to face milling?

How to differentiate between up and down milling operations?

Write about the operations related to peripheral milling?

Comments:

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