TYPES OF MILLING MACHINE

- The milling machine may be classified in several forms, but the choice of any particular machine is determined primarily by the size of the workpiece.
- According to general design, the distinctive types of milling machines are:

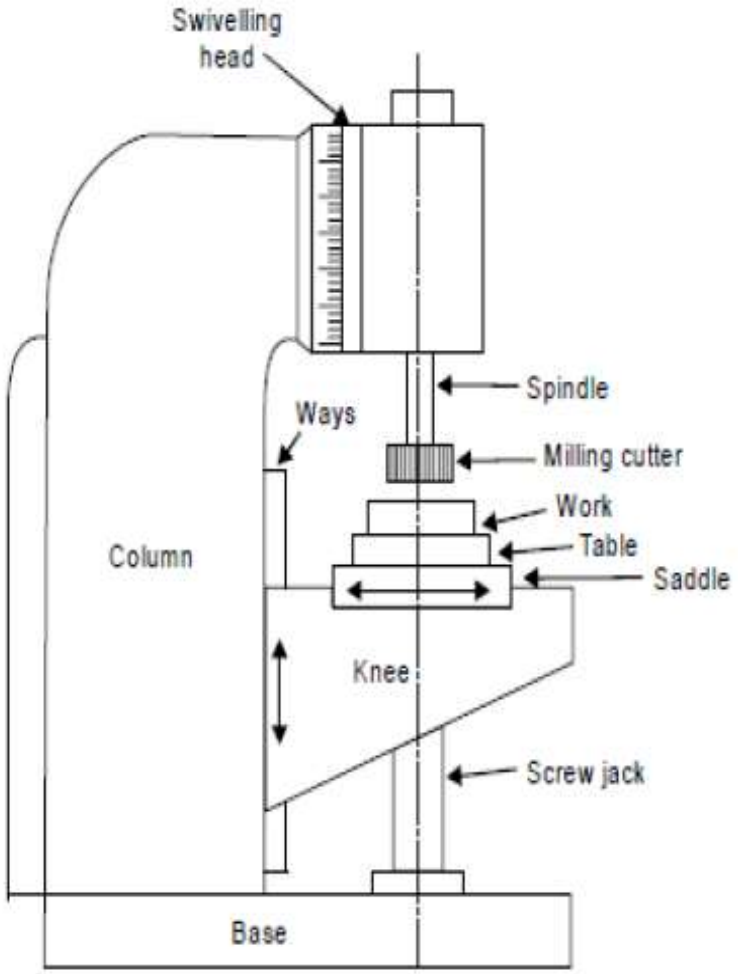
1. Column and knee type milling machines
2. Planer milling machine
3. Fixed-bed type milling machine
4. Special types of milling machines

PRINCIPLE PARTS

- Base
- Column
- Knee
- Saddle
- Table
- Spindle

COLUMN AND KNEE TYPE

- It is the most commonly used milling machine used for general shop work.
- The table is mounted on the knee which in turn is mounted on the vertical slides of the main column.
- The knee is vertically adjustable on the column so that the table can be moved up and down to accommodate work of various heights.



CLASSIFIACTION OF COLUMN & KNEE TYPE MILLING MACHINE

(a) Hand milling m/c.

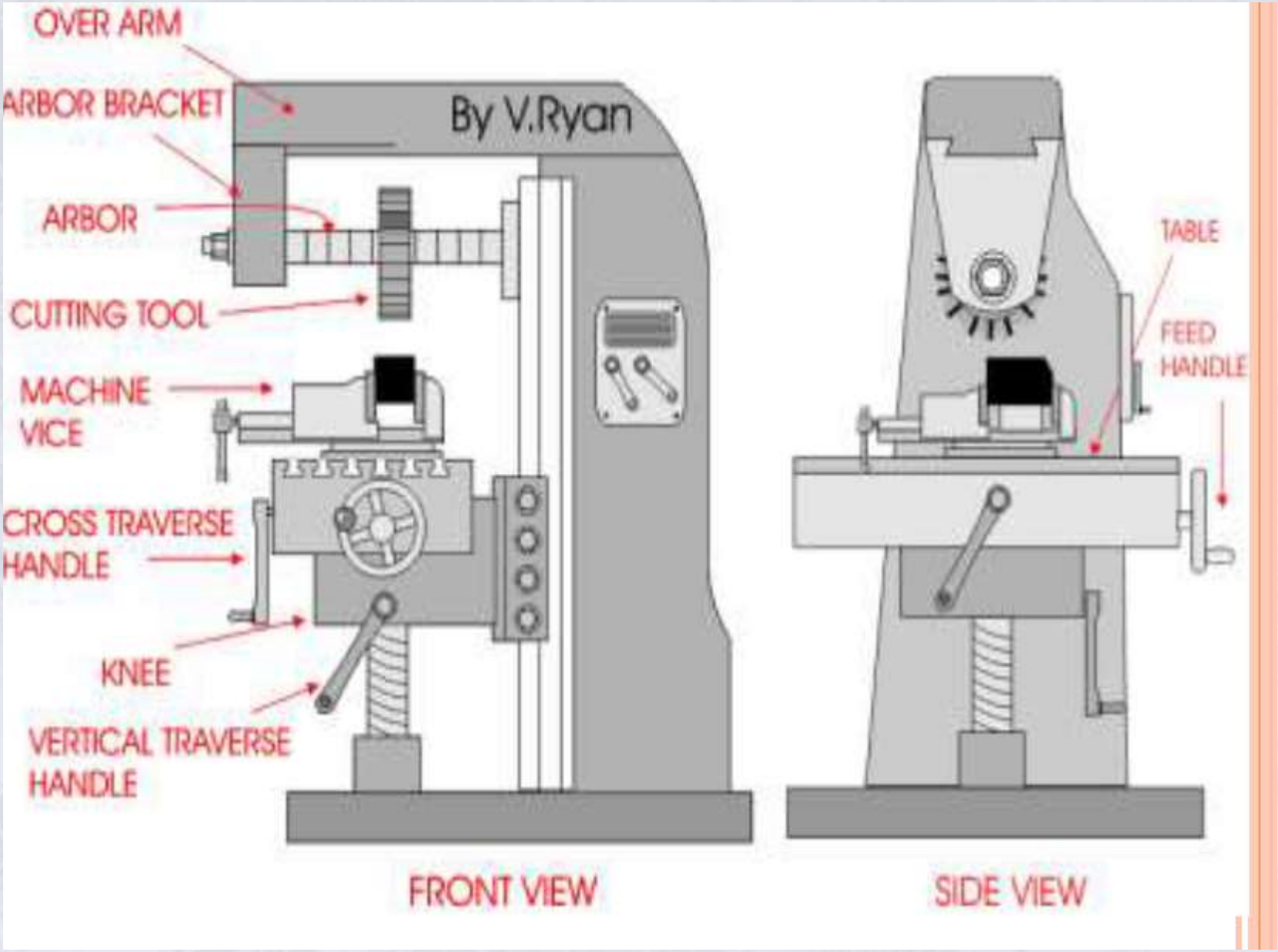
(b) Horizontal milling m/c.

(c) Universal milling m/c.

(d) Vertical milling m/c.

(a) Horizontal Milling machine

- The horizontal milling machine has a spindle that is parallel to the shop floor and an overarm that extends over the workpiece.
- The overarm supports the arbor, which holds the milling cutter.
- On the horizontal mill, the arbor is the component that rotates the milling cutter.



ACTUAL HORIZONTAL MILLING MACHINE

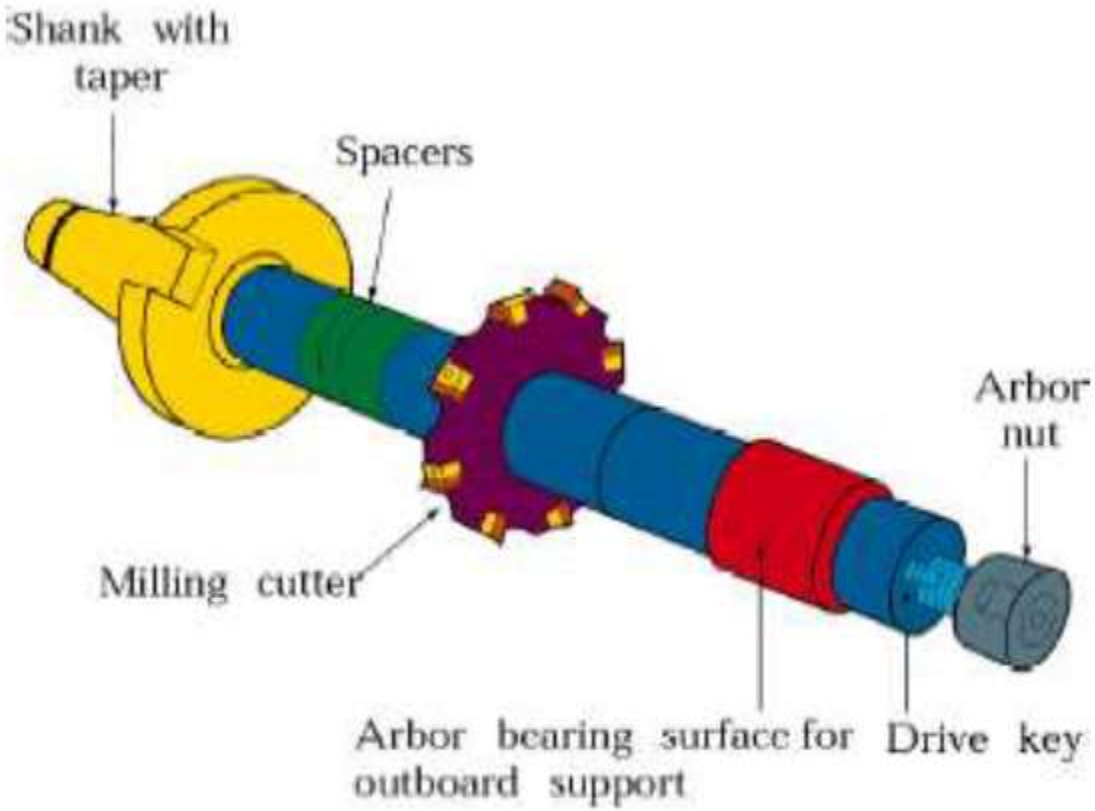
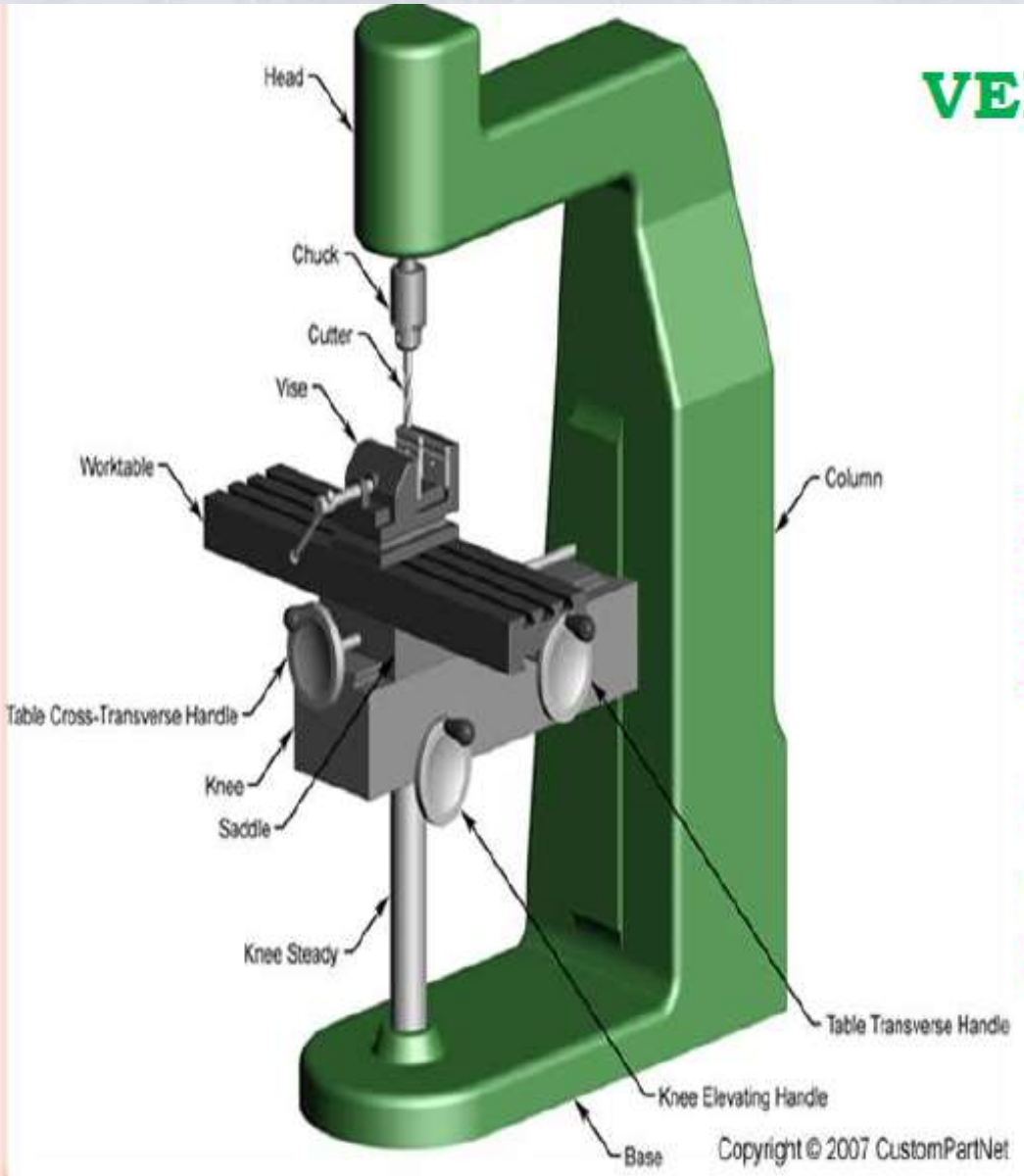


Fig : Mounting a milling cutter on an arbor for use on a horizontal milling machine.

(B) VERTICAL MILLING MACHINE

- Spindle is vertical or perpendicular to the work table.
- It has all the movements of the table for proper setting and feeding the work.
- Spindle head may be swiveled at an angle, permitting the milling cutter mounted on the spindle to work on angular surfaces.
- In some machines, spindle can also be adjusted up or down relative to the work.
- Adopted for machining grooves, slots and flat surfaces.

VERTICAL MILLING MACHINE



MAJOR PARTS :

1. BASE
2. COLUMN
3. SPINDLE
4. SPINDLE HEAD
5. KNEE
6. SADDLE
7. WORKTABLE

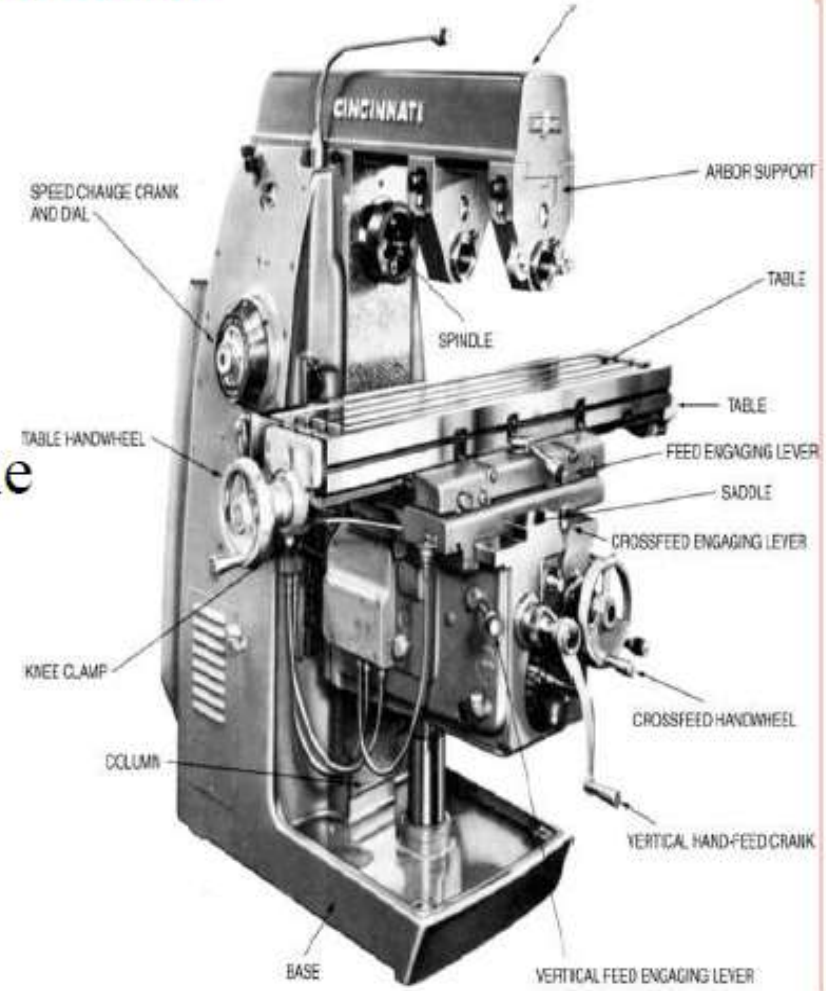
DIFFERENCES BETWEEN HORIZONTAL & VERTICAL MILLING MACHINES

SL. NO.	HORIZONTAL MILLING MACHINE	VERTICAL MILLING MACHINE
01	Spindle is horizontal & parallel to the worktable.	Spindle is vertical & perpendicular to the worktable.
02	Cutter cannot be moved up & down.	Cutter can be moved up & down.
03	Cutter is mounted on the arbor.	Cutter is directly mounted on the spindle.
04	Spindle cannot be tilted.	Spindle can be tilted for angular cutting.
05	Operations such as plain milling, gear cutting, form milling, straddle milling, gang milling etc., can be performed.	Operations such as slot milling, T-slot milling, angular milling, flat milling etc., can be performed and also drilling, boring and reaming can be carried out.

(c) Universal Milling Machine

Difference from plain horizontal machine is addition of table swivel housing Permits table to be swiveled 45° in either direction in a horizontal plane

Used for milling of helical grooves in twist drills, milling cutters, and gears

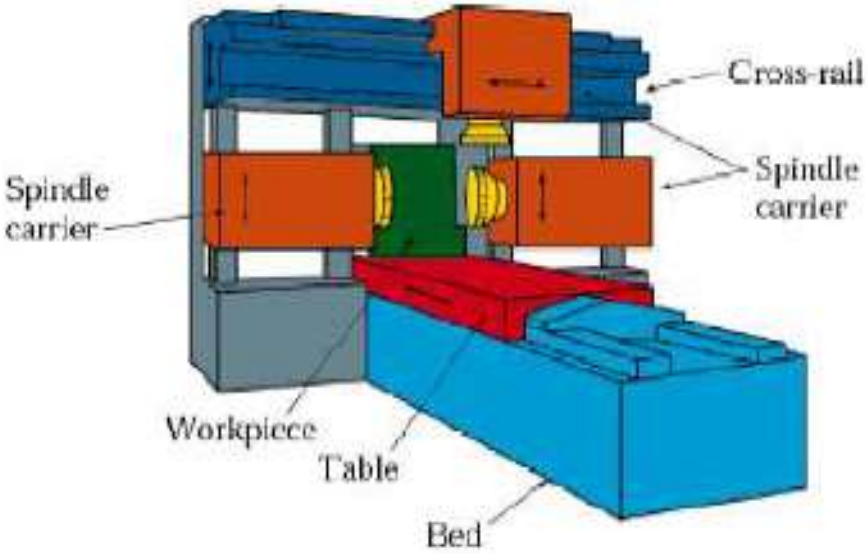


2. Fixed-bed type milling machine

- Comparatively large, heavy and rigid and differ from column and knee type milling machines.
- Table is directly mounted on fixed bed.
- No provision is provided for cross or vertical adjustment of the table.
- The cutter mounted on the spindle head may be moved vertically on the column and the spindle may be adjusted horizontally to provide cross adjustment.
- Three types

1. Simplex 2. duplex 3. triplex

FIXED BED MILLING MACHINE



3. PLANER MILLING MACHINE

- Looks like double column planer machine.
- Milling heads mounted in various planes, vertical heads on the cross-rail and horizontal heads at the sides (on column)
- This arrangement enables it to machine a workpiece on several sides simultaneously
- Used for producing long straight surfaces on large and heavy machine parts.

5. Special-Type Machines

Designed for individual milling operations

Used for only one particular type of job

Completely automatic Employed when hundreds or thousands of similar pieces are to be machined

➢ **Tracer mills (Profiling milling machines):**

- Also called duplicators
- Designed to reproduce an irregular part geometry that can be created on an template
  - In two dimensions- ***tracer***
  - In three dimensions- ***duplicator***

Special-Type Machines

- **CNC milling machines:**
- - Cutter path controlled by numerical data
- - Suited to profile, pocket, surface contouring.