

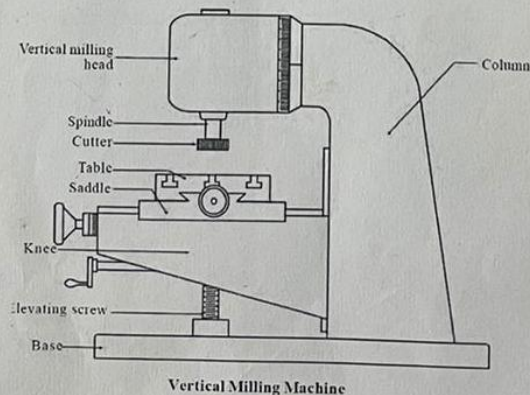
MILLING

Theory:

Milling machine is a machine tool that removes materials as the work is feed against the rotating multipoint cutter. The cutter rotated at a high speed and because of multiple cutting edges it removes material at very faster rate. The machine can hold one or more number of cutters at a time. This is why the milling machine finds its application in the production work. The mechanism of milling machine is composed of spindle drive mechanism and power feed mechanism. The spindle drive mechanism is incorporated in the column. The power is transmitted from the feed gear box. The main limitation of the milling machine is, it can't produce sharp corners.

Parts of Milling Machine:

1. **Base:** It is the foundation part of a milling machine. All other parts are jointed on it. It carries the entire load so it should have high compressive strength so it is made by cast iron. It also works as reservoir of cutting fluid.
2. **Column:** Column is another foundation part of milling machine. It is mounted vertically on the base. It supports the knee, table etc. Work as housing for the all the other driving member. It is a hollow member which contains driving gears and sometimes motor for spindle and the table.
3. **Knee:** Knee is the first moving part of milling machine. It is mounted on the column and moves along the slide ways situated over the column. It is made by cast iron and moves vertically on slide ways. It moves up and down on sideways which change the distance between tool and workpiece. It is driven by mechanically or hydraulically.
4. **Saddle:** It is placed between table and the knee and work as intermediate part between them. It can move transversally to the column face. It slides over the guideways provided situated on the knee which is perpendicular to the column face. The main function of it is to provide motion in horizontal direction to work piece. It is also made by cast iron.
5. **Table:** Table is situated over the knee. It is the part of machine which holds the workpiece while machining. It is made by cast iron and have T slot cut over it. The workpiece clamp over it by using clamping bolts. The one end of clamping bolt fix into this slot and other is fix to work piece which hold the work piece. It can provide three degree of freedom to work piece.
6. **Spindle:** Spindle is the main part of the machine which hold tool at right place in vertical milling machine and hold arbor in horizontal milling machine. It is a moving part which is in rotary motion. It is motor driven and drives the tool. It has a slot on the front end of it. The cutting tool fix in that slot.
7. **Ram:** Ram is work as overhanging arm in vertical milling machine. One end of the arm is attached to the column and other end to the milling head.



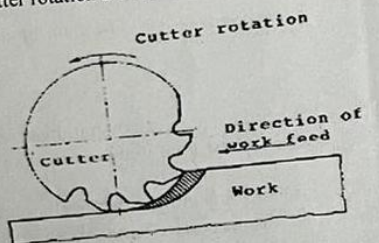
Note the direction of rotation of the milling cutter

Climb Milling:

The cutter tends to climb over the work. The advantage of this method is that when taking heavy cuts, the work is forced down on to the machine table the feed force is also reduced.

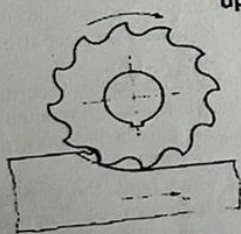
Up milling:

The cutter rotation and direction of feed is in same direction

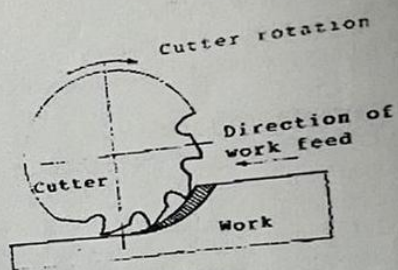


Conventional (or)

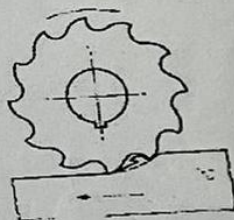
up cut Milling



Up Milling



Climb Milling



Down Milling

Experiment Number-

Aim of the experiment: To perform face milling operation on a cube block by using milling machine.

Raw Materials Required:

Cast iron block of (50×50×50 mm)

Tools and Equipments Required:

- i. Base pan hammer.
- ii. Brush
- iii. Vernier height gauge
- iv. Vernier caliper
- v. Spirit level
- vi. Double ended spanner
- vii. Milling Machine

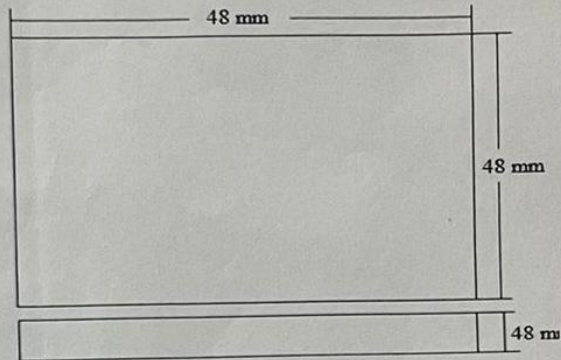


Figure: Layout of the Job

Procedure:

- Use vernier height gauge to draw lines on the job surface to make it square.
- Fix the block in the milling machine.
- Set the feed, spindle speed and depth of cut.
- Mill the surface of the block until the height of the job reduced to 48 mm.
- After getting required dimensional product, clean the surface of the block by using brush.

Precautions:

- The job should be properly cleaned.
- Tool should be properly fixed in the tool head.
- Do not touch the block, tool head, and any other component of the machine, when the machine is working.
- Proper attention should be given to the machine.

Conclusion:

The job was prepared successfully and safely.