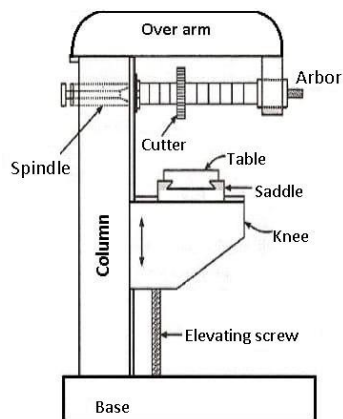


Milling Machine

This full article is about milling machine operations. If you haven't read our complete article on [types of milling machine you can read now by clicking here](#). Let's start with some little introduction about milling machine and milling machine operations.

A milling machine is a machine tool that cuts metal as the workpiece is fed against a rotating multipoint cutter. The [milling cutter](#) rotates at a very high speed because of the multiple cutting edges, it cuts the metal at a very fast rate. This machine can also hold single or multiple cutters at the same time.



This is why a milling machine has wide application in [production work](#). This is better for other machines as regards accuracy and better surface finish. And also it is designed for machining a variety of tool room work.

Milling Machine Operations

The 15 different **types of milling machine operations** are as follow:

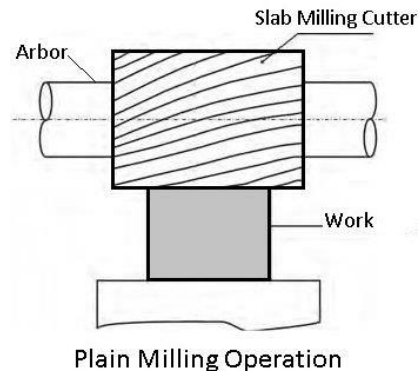
1. Plain Milling Operation
2. Face Milling Operation
3. Side Milling Operation
4. Straddle Milling Operation
5. Angular Milling Operation
6. Gang Milling Operation
7. Form Milling Operation
8. Profile Milling Operation
9. End Milling Operation
10. Saw Milling Operation
11. Milling Keyways, Grooves and Slot
12. Gear Milling
13. Helical Milling
14. Cam Milling
15. Thread Milling

Read also: [Types of Milling Cutters \[Complete Guide\]](#)

Read also: [Milling Machine: Main Parts and It's Working Principle](#)

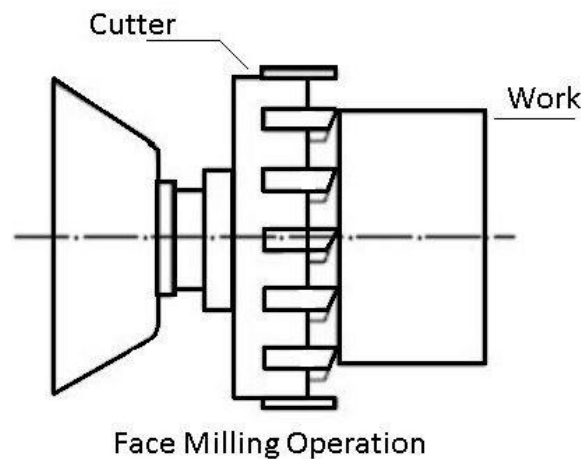
Types of Milling Machine Operations

Plain Milling



- The plain milling is the most common types of milling machine operations.
- Plain milling is performed to produce a plain, flat, horizontal surface parallel to the axis of rotation of a plain milling cutter.
- The operation is also known as slab milling.
- To perform the operation, the work and the cutter are secured properly on the machine.
- The depth of cut is set by rotating the vertical feed screw of the table. And the machine is started after selecting the right speed and feed.

Face Milling



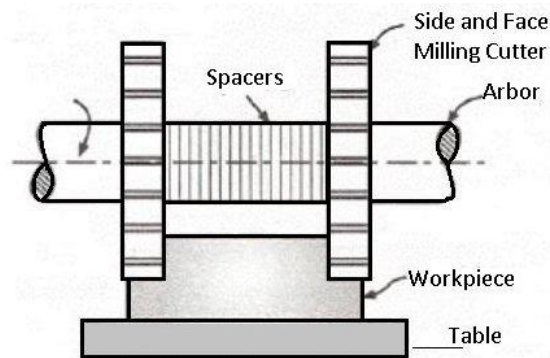
- The face milling is the simplest milling machine operations.
- This operation is performed by a face milling cutter rotated about an axis perpendicular to the work surface.
- The operation is carried in plain milling, and the cutter is mounted on a stub arbor to design a flat surface.
- The depth of cut is adjusted by rotating the crossfeed screw of the table.

Read Also: [Metal Saw Machine and Types of Sawing Machine](#)

Side Milling

- The side milling is the operation of producing a flat vertical surface on the side of a workpiece by using a side milling cutter.
- The depth of cut is set by rotating the vertical feed screw of the table.

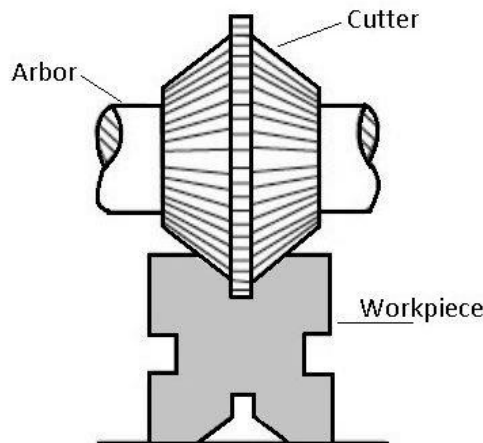
Straddle Milling



Straddle Milling Operation

- The straddle milling is the operation of producing a flat vertical surface on both sides of a workpiece by using two side milling cutters mounted on the same arbor.
- Distance between the two cutters is adjusted by using suitable spacing collars.
- The straddle milling is commonly used to design a square or hexagonal surfaces.

Angular Milling

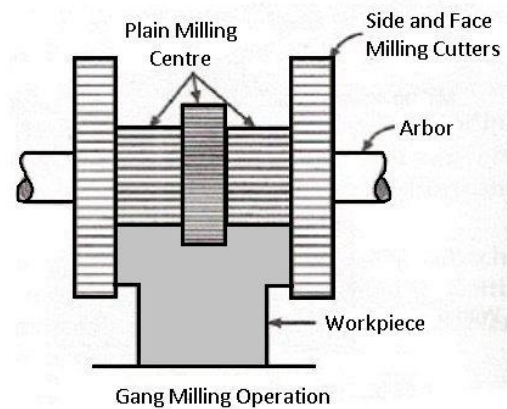


Angular Milling

- The angular milling is the operation of producing an angular surface on a workpiece other than at right angles of the axis of the milling machine spindle.
- The angular groove may be single or double angle and may be of varying included angle according to the type and contour of the angular cutter used.
- One simple example of angular milling is the production of V-blocks.

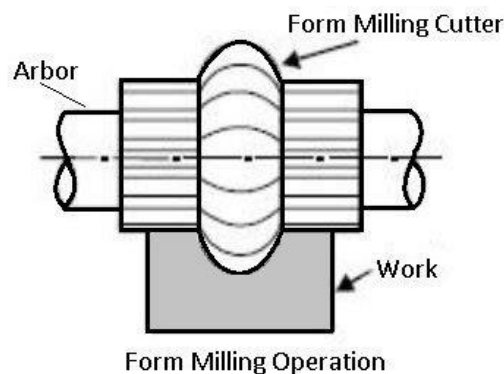
Read Also: [Broaching Machine: Types, Operations, Advantages and Broaching Methods](#)

Gang Milling



- The gang milling is the operation of machining several surfaces of a workpiece simultaneously by feeding the table against a number of cutters having the same or different diameters mounted on the arbor of the machine.
- The method saves much of machining time and is widely used in repetitive work.
- Cutting speed of a gang of cutters is calculated from the cutter of the largest diameter.

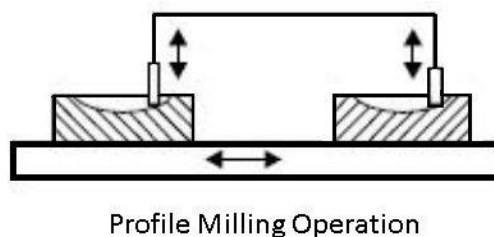
Form Milling



- The form milling is the operation of producing the irregular contour by using form cutters.
- The irregular shape may be convex, concave, or of any other shape. After machining, the formed surface is inspected by a template gauge.
- Cutting rate for form milling is 20% to 30% less than that of the plain milling.

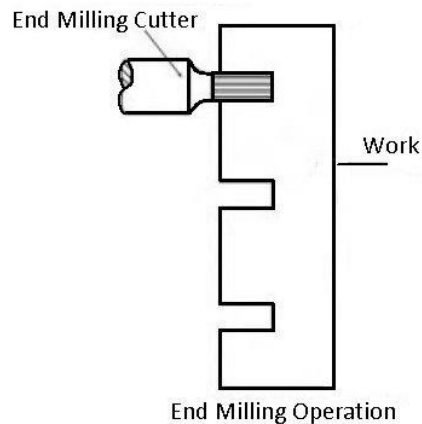
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Profile Milling



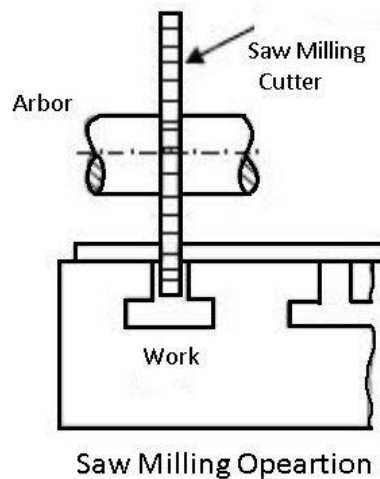
- The profile milling is the operation of reproduction an outline of a template or complex shape of a master dies on a workpiece.
- Different cutters are used for profile milling. An end mill is one of the widely used milling cutters in profile milling work.

End Milling



- The end milling is the operation of producing a flat surface which may be vertical, horizontal or at an angle in reference to the table surface.
- The cutter used is an end mill. The end milling cutters are also used for the production of slots, grooves or keyways.
- A vertical milling machine is more suitable for end milling operation.

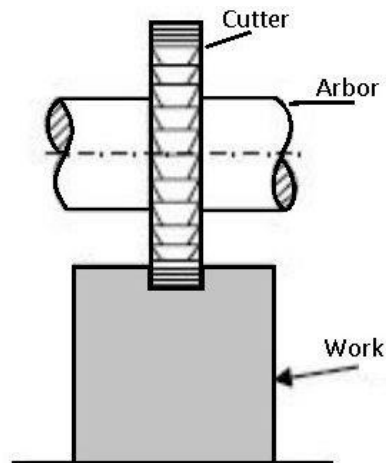
Saw Milling



- Saw-milling is the operation of producing narrow slots or grooves on a workpiece by using a saw-milling cutter.
- The saw-milling also performed for complete parting-off operation.
- The cutter and the workpiece are set in a manner so that the cutter is directly placed over one of the T-slots of the table.

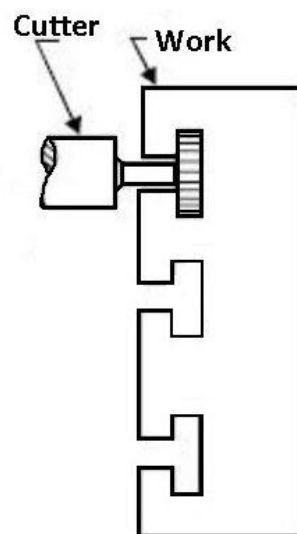
Read Also: [6 Different types of Shaper Machine Operations](#)

Milling Keyways, Grooves and Slots



Keyway Milling Operation

- The operation of producing of keyways, grooves and slots of varying shapes and sizes can be performed in a milling machine.
- It is done by using a plain milling cutter, a metal slitting saw, an end mill or by a side milling cutter.
- The open slots can be cut by a plain milling cutter, a metal slitting saw, or by a side milling cutter. The closed slots are produced by using endmills.

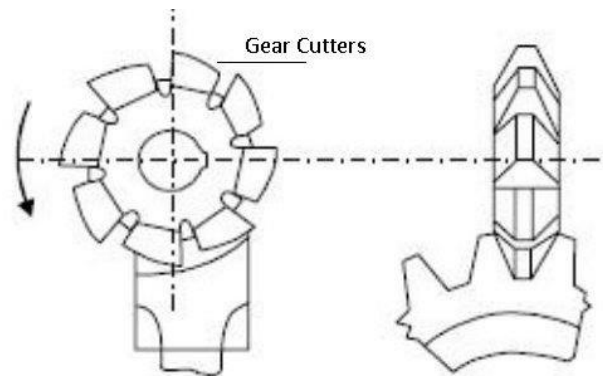


T-Slot Milling Operation

- A dovetail slot or T-slot is manufactured by using special types of cutters designed to give the required shape on the workpiece.
- The second slot is cut at right angles to the first slot by feeding the work past the cutter.
- A woodruff key is designed by using a woodruff key slot cutter.
- Standard keyways are cut on the shaft by using side milling cutters or end mills.
- The cutter is set exactly at the centre line of the workpiece and then the cut is taken.

Read Also: [4 Different Types of Shaper Machine Mechanism](#)

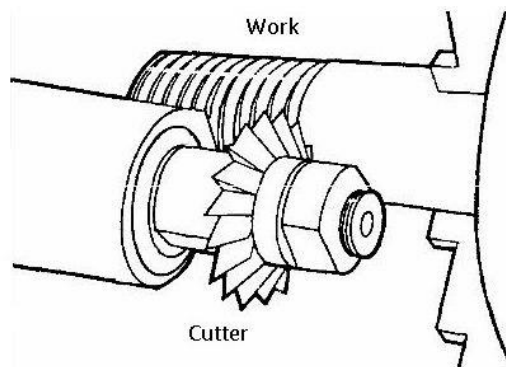
Gear Cutting



Gear Cutting Milling Operation

- The gear cutting operation is performed in a milling machine by using a form-relieved cutter. The cutter may be a cylindrical type or end mill type.
- The cutter profile fits exactly with the tooth space of the gear.
- Equally spaced gear teeth are cut on a gear blank by holding the work on a universal dividing head and then indexing it.

Helical Milling



Helical Milling Operation

- The helical milling is the operation of producing helical flutes or grooves around the periphery of a cylindrical or conical workpiece.
- The operation is performed by rotating the table to the required helix angle. And then by rotating and feeding the workpiece against rotary cutting edges of a milling cutter.
- Production of the helical milling cutter, helical gears, cutting helical grooves or flutes on a drill blank or a reamer.

Cam Milling

The cam milling is the operation of producing cams in a milling machine by the use of universal dividing head and a vertical milling attachment. The cam blank is mounted at the end of the dividing head spindle and an end mill is held in the vertical milling attachment.

The axis of the cam blank and the end mill spindle should always remain parallel to each other when setting for cam milling. The dividing head is geared to the table feed screw so that the cam is rotated

about its axis while it is fed against the end mill. The axis of the cam can be set from 0 to 90° in reference to the surface of the table for obtaining a different rise of the cam.

Thread Milling

The thread milling machine operations are used to produce threads by using a single or multiple thread milling cutter. Thread milling operation is performed in special thread milling machines to produce accurate threads in small or large quantities.

The operation requires three driving motions in the machine. One for the cutter, one for the work and the third for the longitudinal movement of the cutter.

When the operation is performed by a single thread milling cutter, the cutter head is swivelled to the exact helix angle of the thread. The cutter is rotated on the spindle and the workpiece is revolved slowly about its axis. The thread is completed in one cut by setting the cutter to the full depth of the thread and then feeding it along the entire length of the workpiece.

When the thread is cut by multiple thread milling cutter, the cutter axis and the work spindle are set parallel to each other after adjusting the depth of cut equal to the full depth of the thread. The thread is completed by simply feeding the revolving cutter longitudinal through a distance equal to the pitch length of the thread while the work is rotated through one complete revolution.

That's it, thanks for reading. If you found this article helpful share with your friends.

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