

Shaper and Types of Shaper Machines

The **shaper machine** is a reciprocating type of machine basically used for producing the horizontal, vertical or flat surfaces. The shaper holds the single point cutting tool in ram and workpiece is fixed in the table.

During the forward stroke, the ram holding the tool is reciprocating over the workpiece to cut into the required shape. During the return stroke, No metal is cutting. In the shaper machine, the rotary motion of the drive is converted into reciprocating motion of ram holding the tool.

Therefore in order to reduce the total machine time, It allows the ram holding the tool should move slower during forwarding cutting stroke and it comes faster in return stroke. **This can be achieved by a mechanism called a quick return mechanism.** If you haven't read about the [shaper machine mechanism you can read here.](#)

Shaper Machine Process

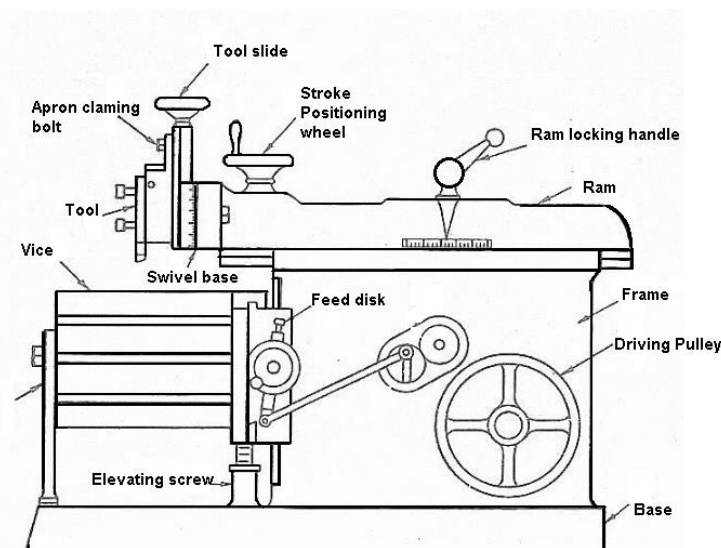
The shaper process can be defined as a process for removing metal from the surface in horizontal, vertical and angular planes by the use of a single-point cutting tool held in a ram that reciprocates the tool in a linear direction across the workpiece held on the table of the machine. The work is fed at right angles to the direction of the ram in small increments, at the end of the return stroke.

Read also: [Shaper machine operations the complete guide](#)

Parts of Shaper Machine

The following are the main **parts of shaper machine**:

1. Base
2. Column
3. Cross-rail
4. Table
5. Ram



The arrangement of shaper machine is made as shown in the figure. It consists of the following parts.

1. Base

- The base is the necessary bed or support required for [all machines tools](#).
- The base is hollow [casting made of](#) cast iron to resist vibration and on which all parts of the shaper are mounted.
- It is so designed that it can take up the entire load of the machine and the forces set up by cutting tool over the work.

2. Column

- This is made of cast iron, which is a box-like and is mounted on the base.
- two accurately machined guideways are provided on the top of the column on which the ram reciprocates.
- The column acts as a cover to the drive mechanism and also supports the reciprocating ram and the worktable.

3. Cross-rail

- Cross rail is mounted on the front vertical surface of the column on which saddle is mounted.
- The vertical movement is given to the table by raising or lowering the cross rail using the elevating screw.
- The horizontal movement is given to the table by moving the saddle using the crossfeed screw.

4. Table

- The table is bolted to the saddle and receives crosswise and vertical movements from saddle cross rail.
- T-bolts are used for clamping on top and sides.
- The table can be swiveled at any required angle.
- In a universal shaper, the table may be swiveled on a horizontal axis and the upper part of the table may be fitted up or down.
- In heavier type shaper the table clamped with table support to make it more rigid.

5. Ram

- The ram reciprocates on the column guideways and carries the tool head with a single-point cutting tool.
- the tool head is in the clapper box, which causes cutting action only in a forward stroke of the ram and sliding movement of the tool in the reverse stroke of the ram.
- the depth of cut or feed of the tool is given by down feed screw.
- The tool head has swivel base degree graduations, which helps to move the tool head to any desired inclination for machining inclined surfaces on the workpieces.

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

Types of Shaper Machines

Following are the different **types of shaper machines**.

1. Based on the type of driving mechanism.
 1. Crank type shaper.
 2. Geared type shaper.
 3. Hydraulic type shaper.
2. Based on ram travel.
 1. Horizontal shaper
 2. Vertical shaper.
3. Based on the table design.
 1. Standard shaper.
 2. Universal shaper.
4. Based on cutting stroke.
 1. Push cut type
 2. Draw cut type

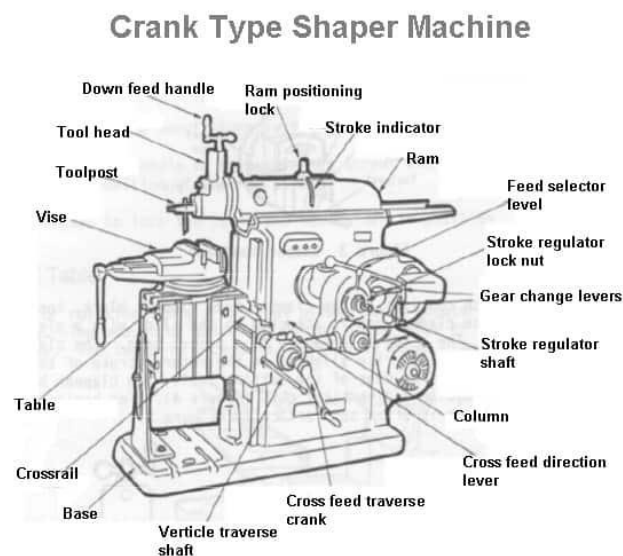
Read also: [What are the types of shaper mechanism](#)

1. Bases on the Type of Driving Mechanism

Following are the different types of shaper machines based on the type of driving mechanism

1.1 Crank Type Shaper Machine

These are very common types of shaper machines, which is using to hold the workpiece on the table. The tool is reciprocating in motion equal to the length of the stroke desired while the work is clamped in position on an adjustable table.



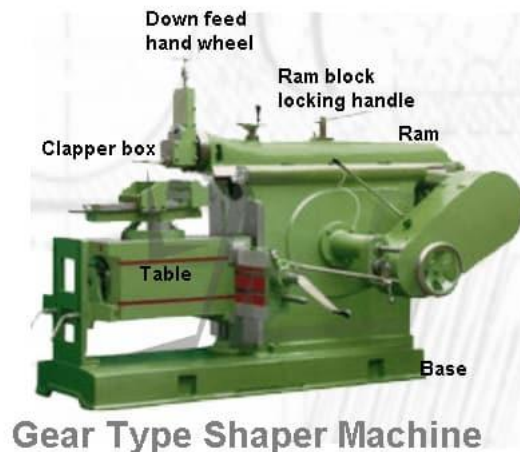
In construction, the crank shaper employs a crank mechanism to change the circular motion of a large gear called "bull gear" incorporated in the machine to reciprocation motion of the ram.

Shaper Machines and Its Types

It uses a crank mechanism to convert the circular motion of the bull gear into reciprocating motion of the ram. The ram carries a tool head at its end & provides the cutting action.

1.2 Gear Type Shaper Machine

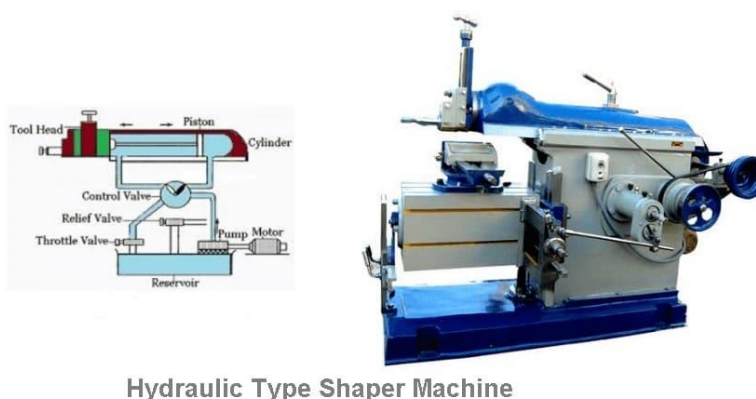
In these types of shaper machines, the ram is reciprocating. The ram is affected due to reciprocating motion with the [rack and pinion](#). The rack teeth are cut directly below the ram [mesh with the spur gear](#).



The speed and the direction in which the machine will traverse depend on the [number of gears in the gear train](#). This type of shaper machines is not widely using in any industry.

1.3 Hydraulic Shaper Machine

In these types of shaper machines, the reciprocating motion of the ram is provided by the hydraulic mechanism. The Hydraulic shaper uses the oil under high pressure. The end of the piston rod is connected to the ram.



The high-pressure oil first acts on one side of the piston and then on the other causing the piston to reciprocating and the motion is transmitted to the ram. The main advantages of this type of shaper machine are that the cutting speed and force of the ram drive are constant. From start to end of the cut without making noise and operates quietly.

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

2. Based on Ram Travel

Following are the different types of shaper machine based on ram travel.

2.1 Horizontal Shaper Machine

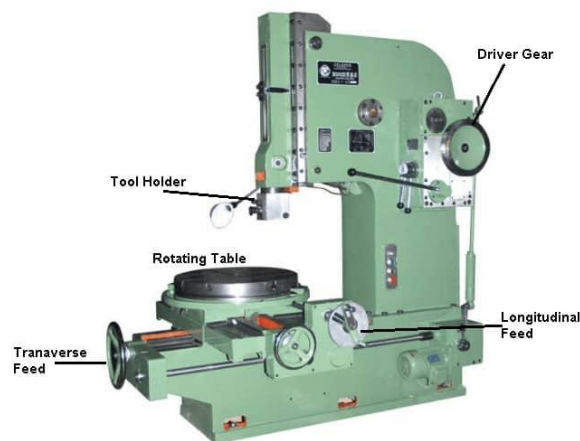


Horizontal Shaper Machine

In these types of shaper machines, the ram is reciprocating. The ram holding the tool in a horizontal axis and reciprocate. This type of shaper is using for the production of flat surfaces, external grooves, keyways etc.

2.2 Vertical Shaper Machine

In these types of shaper machines, the ram reciprocating in vertical plane. In this, the table holds the workpiece. Vertical shapers may be crank driven, rack-driven, screw-driven or hydraulic power-driven.



Vertical Type Shaper Machine

The vertical shaper is very convenient for machining internal surfaces, keyways, slots or grooves. The workpiece can move in any given directions such as the cross, longitudinal or rotary movements. This type of shaper is suitable for machining internal surfaces, slots & keyways.

Read Also: [Cutting speed, Feed, Depth of cut, Machining time in lathe machine](#)

Based on The Table Design

Following are the different types of shaper machine based on the table design.

3.1 Standard Shaper Machine

In this types of shaper machines, the table has only two movements, vertical and horizontal, to give the feed. That's why it known as standard shaper machine. Here the table is not supporting at the outer end.

3.2 Universal Shaper Machine

In this types of shaper machines, in addition to the two moments i.e. vertical and horizontal, the table can be moving in an inclined axis and also it can swivel on its own axis.

Since the workpiece mounted on the can be adjusted in different planes, the shaper os suitable for a different type of operations and is given the name "Universal". This type of shaper is commonly using the tool room works.

Read Also: [Capstan and Turret Lathes](#)

Based on Cutting Stroke

Following are the different types of shaper machine based on cutting stroke.

4.1 Push cut Shaper Machine

In these types of shaper machines, the metal is removed in the forward motion of the ram. This is commonly used types of shaper machines.

4.2 Draw cut Shaper Machine

In these types of shaper machines, the metal is removed in the backward motion of the ram. In this shaper, the tool is fixed in the tool head in the reverse direction so that it provides the cutting action in the reverse stroke of the ram.

That's it. Thanks for reading. If you have any questions about shaper machine and types of shaper machine please leave a comment and I'll respond.

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