Hello Readers, welcome to your own website to understand each and every topic related to manufacturing process where we transform complex content into simpler ones. In this article, we are focused to cover the meaning, shaper machine, quick return motion mechanism, cutting tools and operations performed by shaper machine, working principle of planer machine, difference between shaper and planer and different operations performed by planer machine.

What are Shaper and Planer?

Shaper and planer are machine tools that produce a flat surface. They are capable of machining a horizontal, vertical, or inclined flat surface. They consist of single-point cutting tools which are essentially similar to single-point cutting tools used on a lathe.

What is a Shaping machine or Shaper?

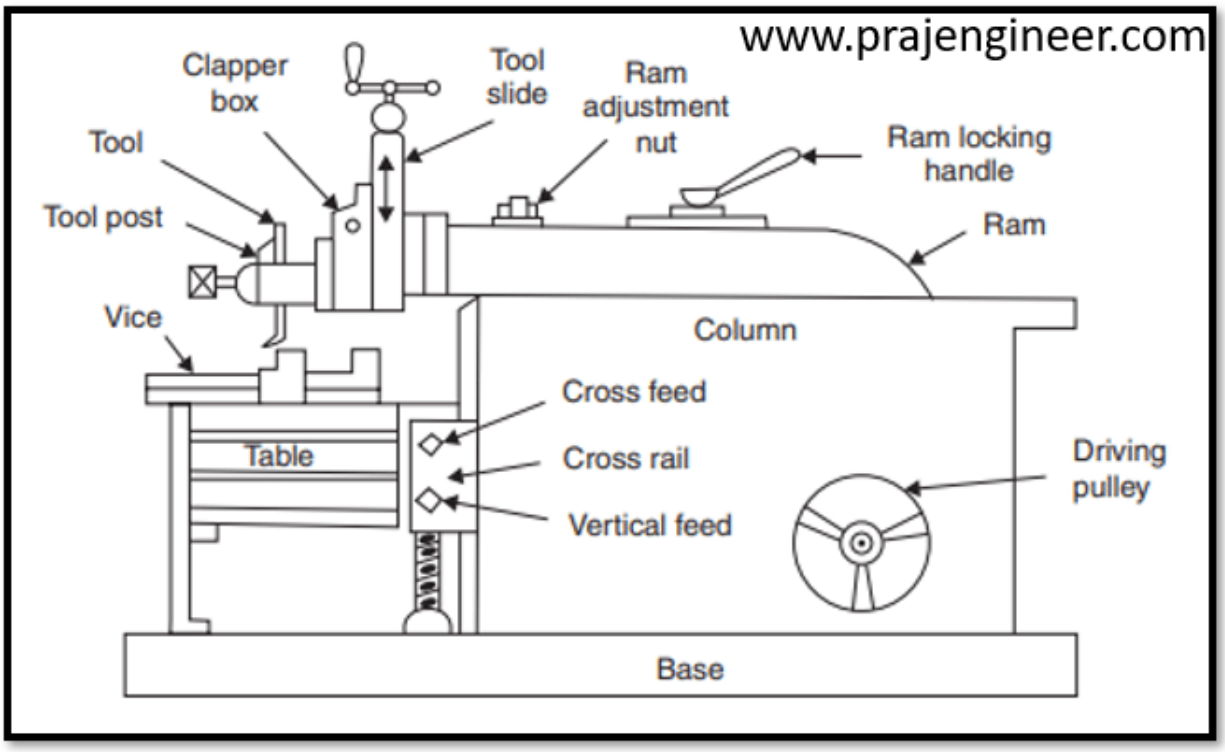

Fig. 1 Shaper machine diagram

- Shaper consists of a hollow machine bed in which the machine drive mechanism is housed, and the complete setup is fixed on the ground.

- **This mechanism is called a slotted lever quick return mechanism and it drives a horizontal ram that reciprocates in the guideways provided on the top surface of the machine frame.**
- It carries a slide that can be operated by a hand wheel and the entire tool post can be lowered or raised.
- Besides, the tool slide can be swivelled in a vertical plane and its inclination to the vertical (amount of swiveling) can be read off on a scale marked in degrees.
- The tool can be inclined to machine complex shapes. A table is fitted at the front portion of base.
- The table can be raised or lowered to vary its height.
- It can also be moved horizontally to the left or right.
- A vice to hold the workpiece is provided on the tabletop.
- The tool only cuts in the forward stroke of the ram.

What is a quick return motion mechanism?

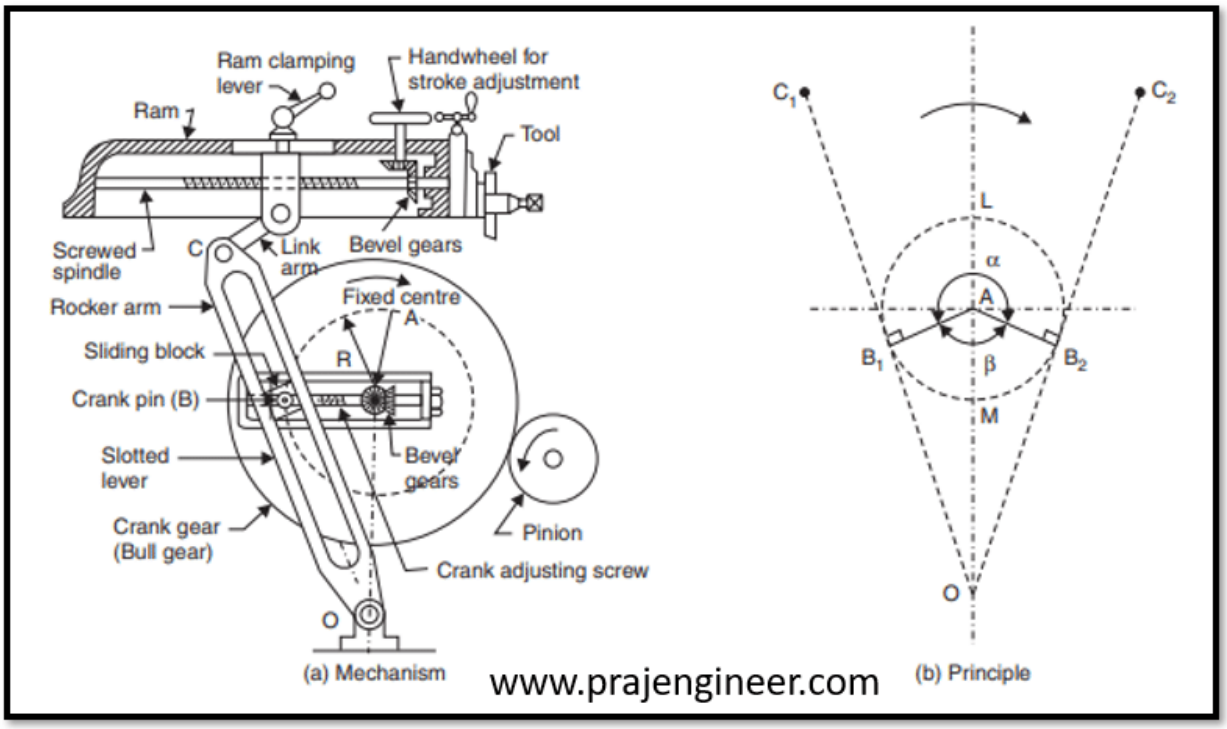

Fig. 2 Quick return mechanism

- Since useful work is done only during the forward stroke of the ram, the mechanism driving the ram is so designed that the return stroke is completed in much less time than the forward stroke.

- The slotted lever quick return mechanism is illustrated in Fig. 2.
- While rotating crank AB achieves uniform angular speed.
- The crankpin B is in the shape of a die block which is free to slide inside the slot in the slotted lever OBC.
- One end C is connected to the ram by a short link arm and the slotted lever is pivoted at O as shown in Fig. 2.
- When the crank AB rotates clockwise from position AB1 to AB2, the ram moves forward from left to right and when it rotates from position AB2 to AB1 the ram returns back to its original position.
- The forward stroke is completed in a particular time which is proportional to angle α while the return stroke is completed in less time which is proportional to angle β.

Which are the cutting tools used in the Shaping process?

Shapers have cutting tools made of H.S.S., either solid or with brazed tips. These tools are made sturdy with fairly generous size for shank and tip. Various types of tools useful for shaping are shown in Fig.

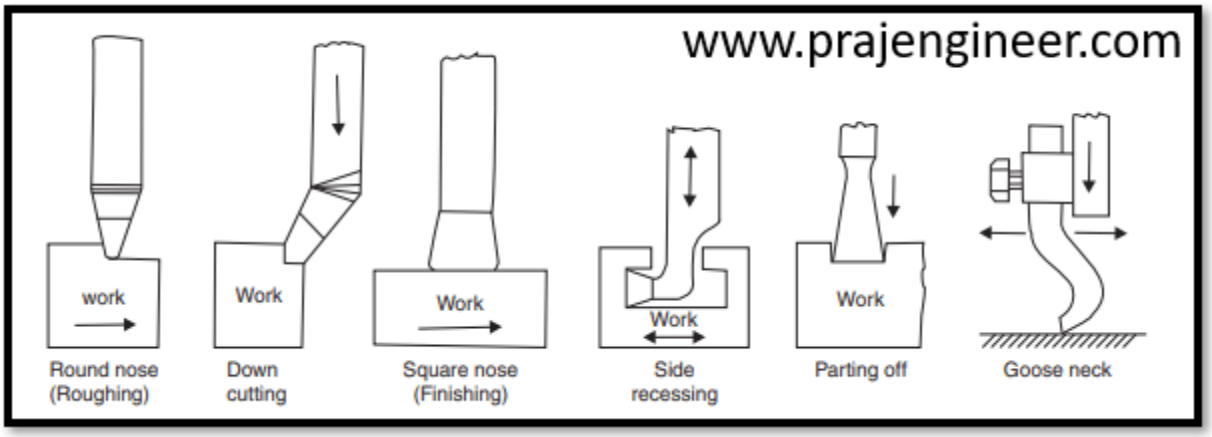

Fig. 3 Cutting tools

What are the different operations performed on shapers?

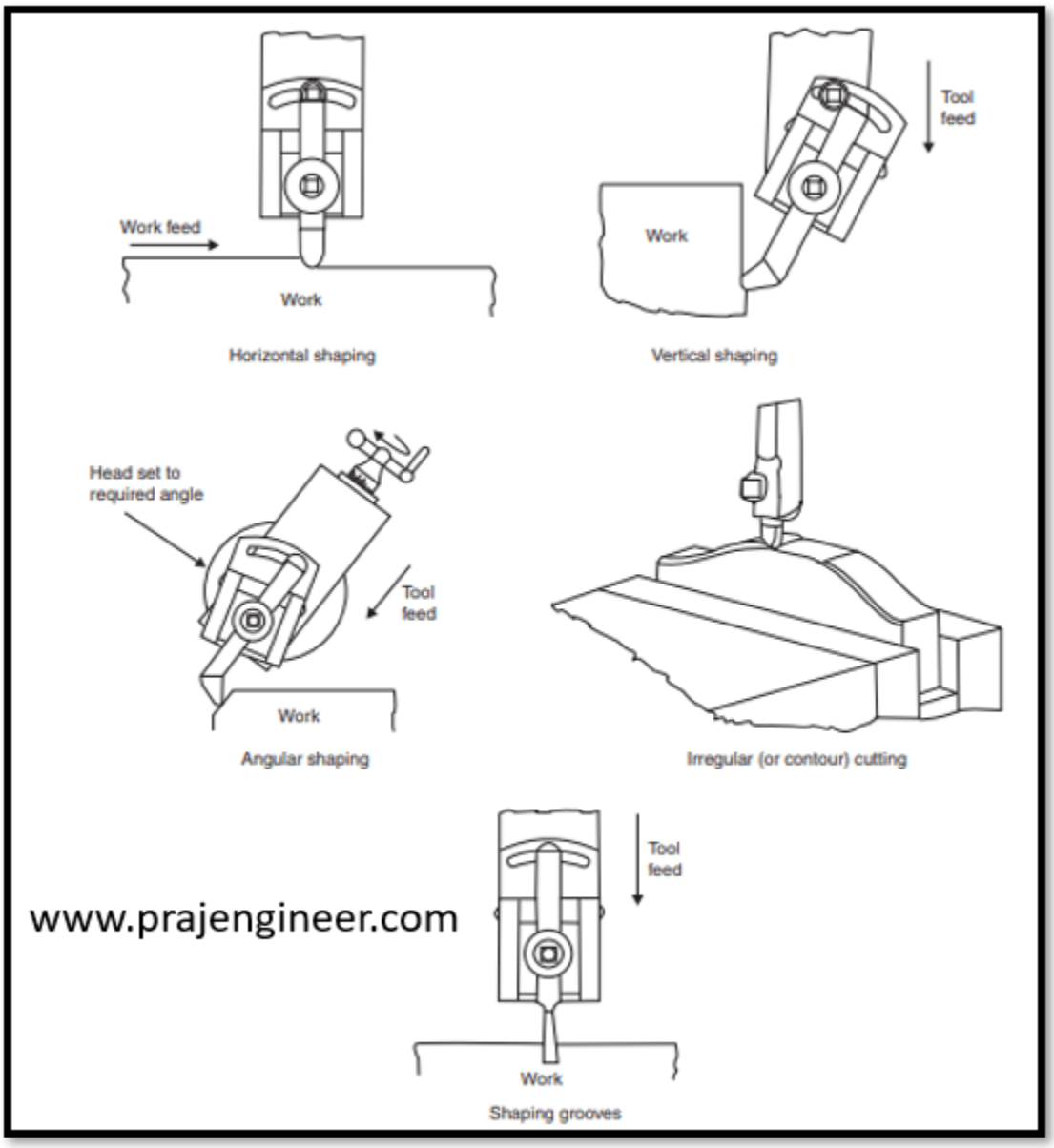

Fig. 4 Operations performed on shaping machine

- **Small jobs can be machined easily on the shaping machine.**
- The size of a shaper is denoted by the maximum length of stroke of its ram and workpieces longer than the maximum stroke cannot be machined.
- In this process the first step is to mount the job on the shaper-table and clamp it tightly in the vice or on the table by means of T-bolts etc.
- The second step is to adjust the stroke of the ram according to the length of the workpiece.

- **The ram stroke is kept about 60–70 mm longer than the job.**
- The stroke can be reduced or increased by altering the length of the crank AB (refer to Fig. 4).
- Now by changing the position of the location where the short link arm is connected to the ram, the stroke is made to overlap the job, so that the stroke starts 30–35 mm before the job and covers the whole length of the workpiece and ends 30–35 mm beyond it.
- The depth of the cut is given by rotating the handwheel and lowering the tool slide. The depth of the cut is not given by raising the table height.
- Table height is adjusted only at the time of fixing the job according to the height of the job.
- The feed is given by shifting the table laterally.
- Manual and automatic options are available on the table to give the feed.
- The feed is given during the return stroke of the ram.
- Operations performed on a shaper can be easily understood from Fig.4.
- A skillful operator can only perform the contour cutting as simultaneous operation of horizontal table feed and vertical hand feed of the cutting tool is to be done.

What is Planing or Planer machine?

Planer is used to machine flat surfaces on workpieces, which are too large and heavy to be accommodated on a shaping machine table. **A planer machine can handle much heavier cuts and more than one tool post is provided on one machine so that machining can be done quickly.** In this process, squareness of the surfaces is automatically ensured.

What is the difference between Shaper and Planer?

The fundamental difference between a planer and shaper is that in a planer, the cutting tool remains stationary and the planer table on which the workpiece has been clamped moves past the cutting tool. The feed is given to the cutting tool and not to the table which reciprocates in the guide ways provided in the machine bed.

What is the working principle of a Planer machine?

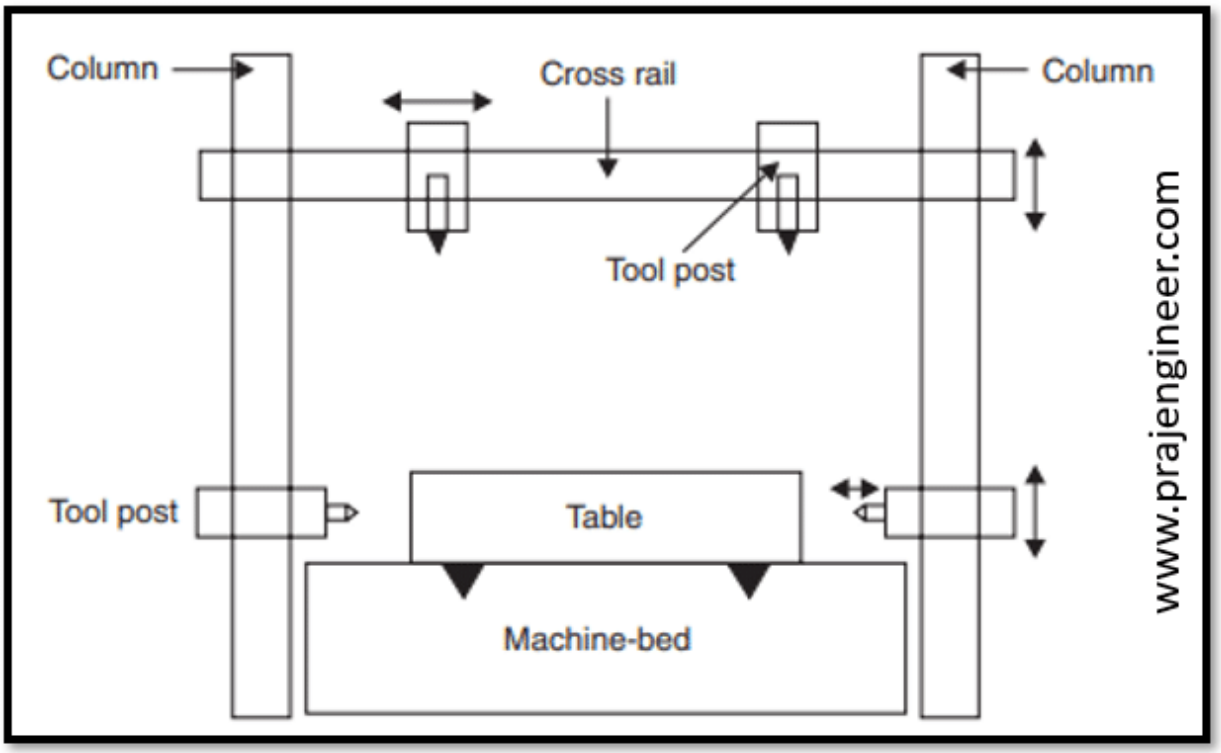

Fig. 5 Planer machine diagram

- The planer consists of a sturdy bed made of cast iron, on the upper surface of which Veeguideways have machined all along the length of the bed.
- The base of the bed is grouted in the ground.
- The table is again made of cast iron having matching guide ways machined at its bottom so that it can slide longitudinally on the machine bed.
- The table has a long rack machined in the center of its width which is used for giving reciprocating motion to the table.
- The table is provided with T-slots on its top surface, so that the workpiece may be clamped securely on the table.
- Two vertical columns, one on each side of the bed and table are located as shown in Fig. 5.
- Two vertical columns are present so that the cross rail can move up and down.
- On the cross rail, vertical tool heads can move laterally while side tool heads can move up and down on the vertical columns.
- There is an arrangement for advancement or retraction of tools in the tool heads.

- A number of speeds and feeds are available for the tool heads.
- The fundamental difference between a planer and shaper is that in a planer, the cutting tool remains stationary and the planer table on which the workpiece has been clamped moves past the cutting tool.
- The cutting tool is provided with the feed and it reciprocates on the machine bed.

Which are the cutting tools used on planer machine?

- **The planer tools are made of high speed steel.**
- These tools are more robust and stronger than shaper tools.
- Specially shaped tools are used on planers for operations like T-slot cutting and dovetail slide cutting.
- It is customary to calculate cutting speed on the basis of average speed during the forward stroke.
- In the case of feed, it is the lateral distance moved by the tool (on the cross-rail) per cutting stroke.
- Some examples of the diverse type of machining operations performed on a planer are shown in below Fig. 6. The surfaces shown shaded have been machined on the planer.

Fig. 6 Various components manufactured by planning/ shaping process

FAQ's related to Shaper and planer:

1. What is Planner machine?

Planer is used to machine flat surfaces on workpieces, which are too large and heavy to be accommodated on a shaping machine table. A planer machine can handle much heavier cuts and more than one tool post is provided on one machine so that machining can be done quickly. In this process, squareness of the surfaces is automatically ensured.

2. What is the working principle of planer machine?

The planer consists of a sturdy bed made of cast iron, on the upper surface of which Veeguideways have machined all along the length of the bed. The base of the bed is grouted in the ground. The table is again made of cast iron having matching guide ways machined at its bottom so that it can slide longitudinally on the machine bed. The table has a long rack machined in the center of its width which is used for giving reciprocating motion to the table. The table is provided with T-slots on its top surface, so that the workpiece may be clamped securely on the table.

3. What is the difference between shaper and planer machine?

The fundamental difference between a planer and shaper is that in a planer, the cutting tool remains stationary and the planer table on which the workpiece has been clamped moves past the cutting tool. The feed is given to the cutting tool and not to the table which reciprocates in the guide ways provided in the machine bed.

CONCLUSION:

We have covered all the important concepts related to shaper and planer. Hope you all are crystal clear with understanding all the concepts mentioned here. If you have any questions, please use the comments section to get in touch with us. Till then have fun and always keep reading!