

Shaper - 4th chapter: potential application areas of a shaper machine.

2. Major components and their function.
3. Explain the automatic table feed mechanism: 19.
- Explain the construction & working of tool head.
- Explain the quick return mechanism through sketch.
- state the specification of a shaper machine.

state the specification of a shaper machine:

→ A shaper machine tool can be specified on the

following basis:-

- length of stroke or cut it can make.
- maximum horizontal travel of table.
- maximum vertical travel of table.
- maximum distance from table to ram.
- length and width of table top or size of table.
- length and depth of table side.

- 1) Number of ram cycles per min.
- 2) Range of ram cycles per min.
- 3) Maximum vice opening.
- 4) Power of motor.
- 5) Tool box takes tool of size.
- 6) Approximate gross and net weight.
- 7) Floor space required.

Q. with a neat sketch, explain the quick return mechanism of a shaper.

- withworth's quick return mechanism in shaper: in a shaper, rotary movement of the drive is converted into reciprocating movement by the mechanism contained within the column of the machine. The ram holding the tool gets the reciprocating movement.
- in a standard shaper metal is removed in the forward cutting stroke, while the return stroke goes idle and no metal is removed during this period.
- To reduce the total machining time it is necessary to reduce the time taken by the return stroke. The shaper mechanism should be so designed that it can allow the ram holding the tool to move at a comparatively slower speed during the forward cutting stroke, the cutting speed depending upon the type of material and machining condition, where during the return stroke

the ram to move at a faster rate to reduce the idle return time.

→ The reciprocating movement of the ram and the quick return mechanism of the machine are usually obtained by any one of the following methods.

- Whitworth quick return mechanism.
- crank and slotted mechanism.
- Hydrostatic shaper "

out of the above, whitworth quick return mechanism is used extensively -

whitworth quick return motion mechanism -  
 This mechanism is mostly used shaping and slotting machines. in this mechanism, the link CD (link 2) forming the turning pair is fixed as shown in figure. The link 2 corresponds to a crank CA (link 3) rotates at a uniform angular speed. The slider (link 4) attached to the crank pin at A slides along the slotted bar PA (link 1) which oscillates at a pivoted point D. The connecting rod PR carries the ram at R to which a cutting tool is fixed. The motion of the tool is constrained along the line RD produced, i.e. along a line passing through D and perpendicular to CD.

b)  $\rightarrow$  position  $CA_1$  to  $CA_2$  through  $\alpha$  in the clockwise direction, the tool moves from left hand end of its stroke to the right hand end through a distance  $2p$ .

$\rightarrow$  Now when the driving crank moves the position  $CA_2$  to  $CA_1$  through an angle  $\alpha$  in the clockwise direction, the tool moves from right hand end of its stroke to the left hand end.

$\rightarrow$  A little consideration will show that the time taken during the left to right movement of the ram will be equal to the time taken by the driving crank to move from  $CA_1$  to  $CA_2$ . Similarly, the time taken during the right to left movement of the ram will be equal to the time taken by the driving crank to move from  $CA_2$  to  $CA_1$ .

$\rightarrow$  Since the crank link  $CA$  rotates at uniform angular velocity therefore time taken during the cutting stroke is more than time taken during the return stroke. In fact the ratio between the time taken during the cutting and return strokes is

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