

Design and Development of Shaper Machine and Clapper Box

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ABSTRACT:

Machine is a piece of equipment with design to do some work. Machine usually need electricity, gas, steam, etc. in order to complete some work for which it is made to design to do. It is the Greatest invention ever happened in the life of human beings. In this different component are arranged in such a way that it can transmit or modify motion, force or power in order to perform some desired work. In general, a machine can run on the behalf of wind, water, thermal, chemical or human power. A machine can be any thing it can be wheel and axle, nut bolt, lever, pulley with the help of which we can easily do our desired work

Types of commonly used machine in industrial are-

- **Lathe machine**
- **Drilling machine**
- **Hobbling machine**
- **Shaper machine**
- **Planer machine**
- **Milling machine**

Here we are working on the part of cutting tool and clapper box of the shaper machine where metal is removed by the reciprocating motion of Ram in which a single point cutting tool is used to remove the metal. So basically, we have designed a dual edge cutting tool which can remove the metal in the backward stroke also, which haven't done yet. In general, the old shaper machine, metal is cutting in the forward stroke only.

I. INTRODUCTION:

Shaper machine is a type of machine

which is used to remove the material from the surface of the workpiece by the usage of Reciprocating single –point cutting tools basically, on horizontal, Vertical and inclined surface. The workpiece is fixed in the machine vice where as the tool there reciprocating on the workpiece by means of ram. It can produce and surfaces compose to straight line element. Shaper were very common in industrial production from the Mid-19th century through the mid-20th.

It has types of shaper machine:-

According to the type of mechanism used for giving reciprocating motion to the ram:

1. ACCORDING TO THE TYPE OF MECHANISM USED FOR GIVING RECIPROCATING MOTION TO THE RAM:

- A) **CRANK TYPE**
- B) **GEARED TYPE**
- C) **HYDRAULIC TYPE**
- D) **TRAVELLING TYPE**

2. ACCORDING TO THE POSITION AND TRAVEL OF RAM:

- A) **HORIZONTAL TYPE**
- B) **VERTICAL TYPE**

3. ACCORDING TO THE TYPE OF DESIGN OF THE TABLE:

- A) **STANDARD TYPE**
- B) **UNIVERSAL TYPE**

4. ACCORDING TO THE TYPE OF CUTTING STROKE:

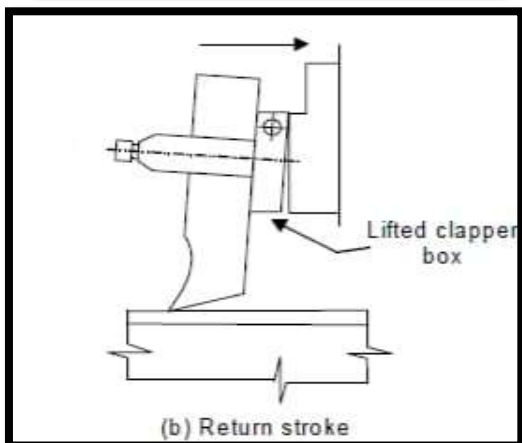
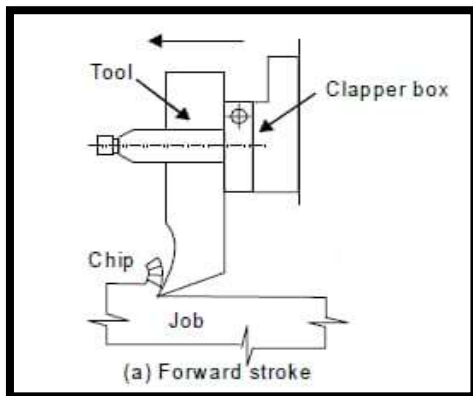
- C) **PUSH TYPE**
- B) **PULL TYPE**

II. REVIEW & DISCUSSIONS :

In a shaper machine, rotary movement of the crank is converted into the reciprocating movement which is carried out by the slider crank mechanism

which occur within the column of the machine. The ram which holds the tool moves to and fro .In a standard shaper machine ,metal is removed in the forward cutting stroke ,while in the backward stroke it goes idle and no metal is removed in the backward or return stroke. The limitations are-

1. It doesn't remove the metal in the backward stroke.
2. It can change the shape of only one workpiece at a time.
3. It can change the shape of only that type of workpiece whose length is more than 25cm.
4. The cutting speed of shaper machine is low.
5. There is no space for the installation of another tool as only one cutting tool is used in this machine.



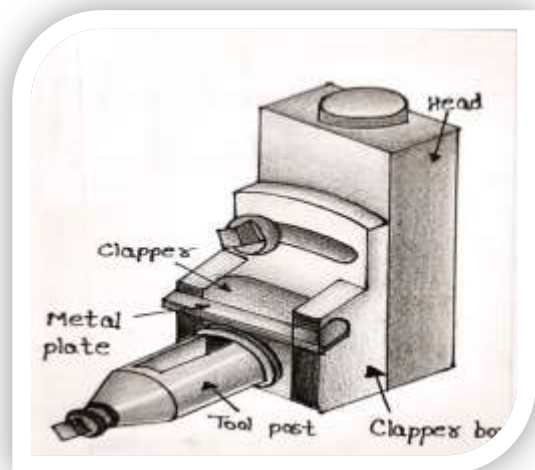
In earlier machine, the shape of cutting tool is single pointed due to this it only removes material in forward stroke.

Instead of single cutting tool we will use dual

cutting edge tool which will remove the material in both forward and backward stroke.

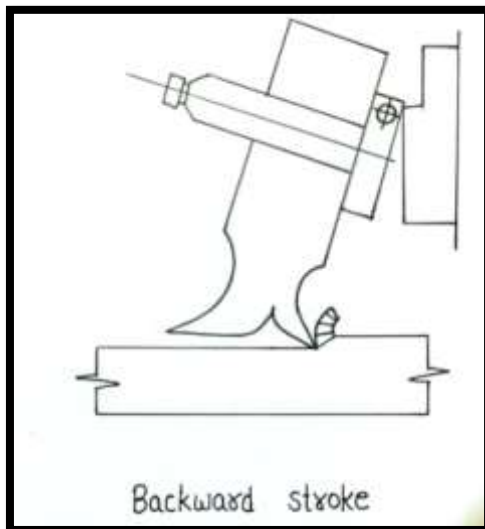
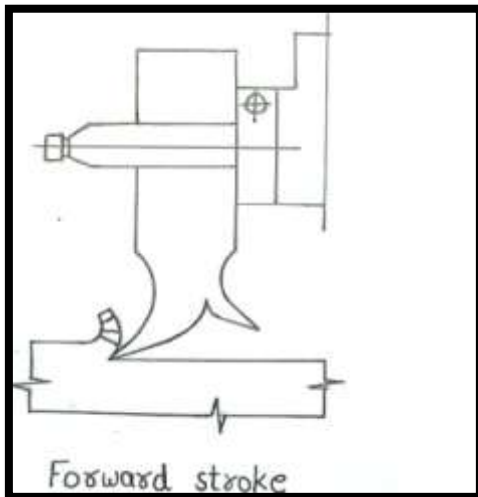
We are reducing the angle of clapper box so that the cutting tool will remove the material in an efficient way. The clapper box is inclined at an angle of 65°. For the double cutting tool it is required to reduce this angle of 65° to lower one that would be sufficient to cutting the metal in the backward stroke.

In order reduced the angle we will weld a metal strip above the screw of clapper box which on backward stroke will reduce the angle from 65° to sufficient degree by clamping the clapper box plate with welded metal plate and thus the full motion of the clapper box plate will be restricted and the shaper machine would be able to cutoff the metal in backward stroke



III. CONCLUSION:

By doing change in the shaper tool, we convert it into single tool shaper to dual tool shaper. In shaper machine we can use only single tool at a time, but after changing the shape we can use dual tool at a time and the shaper cut the material only in forward direction but after changing the shape it work in both directions forward as well as backward. By reducing the angle of the clapper box we done this, without change in the clapper box the new tool can't work in both direction. That's why we have done these changes in the clapper box by adding the metal plate above the tool post by welding.



adjacent to the cutting edge is called flank of the tool.

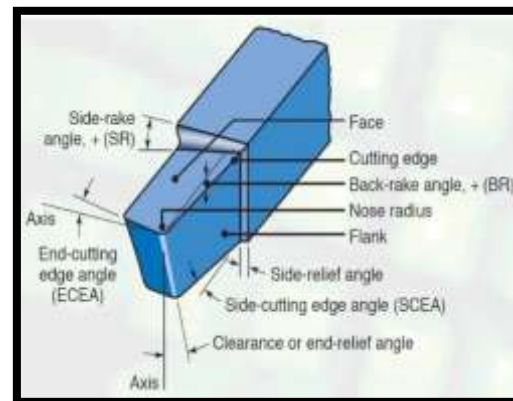
3. Face – The surface on which the chips slide is called the face of the tool.

4.Heel – It is the intersection of the flank and the base of the tool. It is a curved portion at the bottom of the tool.

5. Nose – It is the point where the side cutting edge and end cutting intersect.

6. Nose radius – The nose radius will provide long life and also good surface finish with it a sharp point on the nose.

7. Cutting edge – It is the edge on the face of the tool which removes the material from the workpiece. The tool cutting edge consists of side cutting edge, end cutting edge.



APPENDIX:

Type of commonly used machine in industries are:

- Lathe machine
- Drilling machine
- Milling machine
- Hobbling machine
- Planer machine
- Shaper machine

SHAPER MACHINE:

In shaper machine, single point cutting tool is used to perform operation like turning ,facing ,producing flat surface etc. The nomenclature of different parts of the single point cutting tool are-

1.Shank –This is the main body of the tool. The shank is used to hold the tool that is the tool holder.

2. Flank – The surface or surface below and

TYPES OF SHAPER MACHINES:

A) 1. CRANK SHAPER:

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

2. GEAR SHAPER:

A gear shaper is a machine

tool for cutting the teeth of internal or external gears, it is a specialised application of the more general shaper machine.

3. HYDRAULIC SHAPER:

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 the other causing the

piston to reciprocating and the motion is transmitted to the ram.

4. TRAVELLING SHAPER:

This type of shaper was developed for heavy and large work piece which cannot be placed on the table of a regular shaper. In this type, the ram other than having a reciprocating motion also has a crosswise movement to provide required feed.

B) 1. HORIZONTAL TYPE:

The ram holding the tool on a horizontal axis and reciprocating. This type of shaper is using for the production of flat surface, external grooves, keywords, etc.

2. VERTICAL TYPE:

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

C) 1. STANDARD SHAPER:

In a standard shaper, cutting of material takes place during the forward stroke of the ram and return stroke remains idle. The return is governed by a quick return

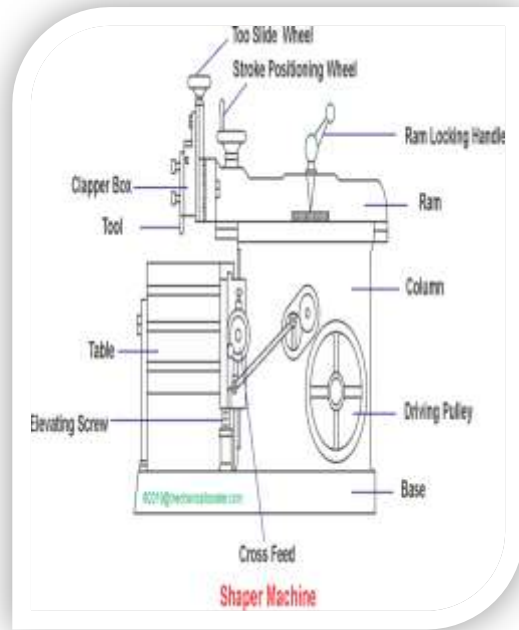
mechanism. The depth of the cut increments by moving the workpiece, and the workpiece is fed by a pawl and ratchet mechanism.

2. UNIVERSAL TYPE:

Universal shape. These are very common types of shaper machine, 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.

D) 1. PUSH TYPE:

It is one of the most commonly used shaper. In this the metal is removed when the ram is moving away from the column. This type of shaper pushes the work piece while removing the work piece away from it so this shaper is called as push type shaper.



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