

5 - Shaper Machine.

Object:- To make a job of given specimen by machining on to the shaper machine according to given specifications.

Materials Required:- Cast iron specimen of job.

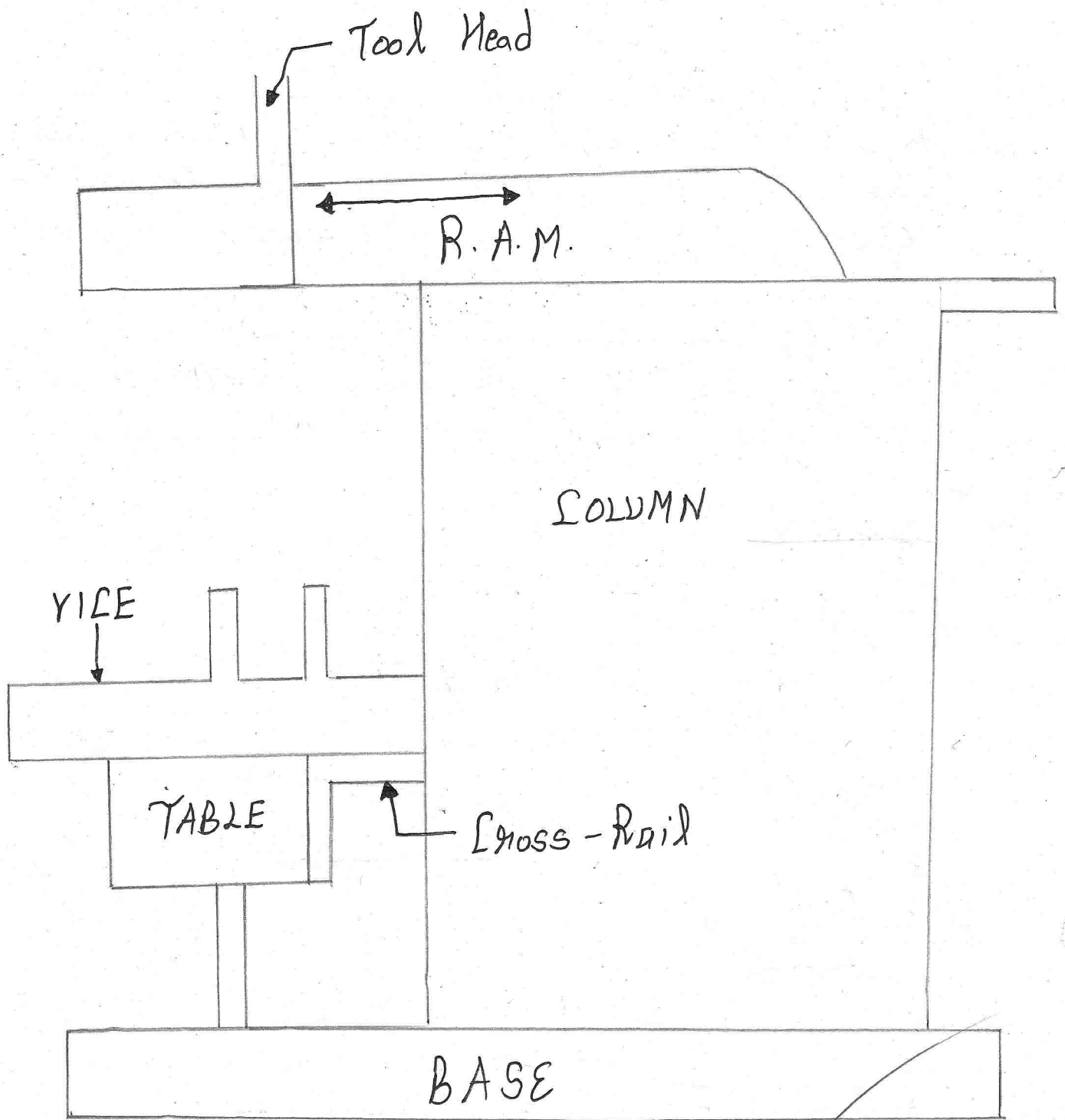
Tools Used:- Shaper Machine.

Shaper Machine:-

Shaper machine is a versatile machine which is primarily intended for producing flat surfaces. These surfaces may be horizontal, vertical or inclined. This machine involves the use of a single point tool held in a properly designed tool box mounted on a reciprocating ram.

Working Principle of Shaper Machine:-

The working principle of a shaper is illustrated in Fig. In case of shaper, the job is rigidly held in a suitable device like a vice or clamped directly on the machine table. The tool is held in the tool post.



BLOCK DIAGRAM OF SHAPER

mounted on the ram of the machine. This ram reciprocates to and fro and in doing so, makes the tool to cut the material in the forward stroke. No cutting of material takes place during the return stroke of the ram. Hence, it is termed as 'idle' stroke. However, in case of a drawcut shaper, the cutting takes place in the return stroke and the forward stroke is an idle stroke.

PRINCIPLE PARTS OF A SHAPER:-

- 1- BASE:- It is a heavy & robust cast iron body which acts as a support for all the other parts of the machine which are mounted over it.
- 2- COLUMN:- It is a box type cast iron body mounted on the base and acts as a housing for the operating mechanism of the machine and the electricals. It also acts as a support for other parts of the machine such as cross rail and ram, etc.

- 3- CROSS-RAIL:- It is a heavy cast iron construction attached to the column at its front on the vertical guideways. It carries two mechanisms; one for elevating the table and the other for cross traverse of the table.
- 4- TABLE:- It is made of cast iron and has a box type construction. It holds and supports the work during the operation and slides along the cross rail to provide feed to the work.
- 5- RAM:- It is also an iron-casting, semi-circular in shape and provided with a ribbed construction inside for rigidity and strength. It carries the tool head and travels in dovetail guideways to provide a straight line motion to the tool.
- 6- Tool Head:- It is a device in which the tool is held. It can slide up and down to a desired angle to set the tool at a desired position for the operation.
- 7- VICE:- It is a job holding device and is mounted on a table. It holds & supports the work during the operation.

TOOL HEAD:-

It is mounted at the front end of the ram. It consists of a vertical slide which can be moved up and down by rotating the feed screw by means of the tool feed handle. The feed screw rotates at its position inside a nut provided at the back of the slide, thus causing the slide to move. At the back of the slide is provided a graduated plate, called the swivel plate, which is bolted to the front end of the ram. This plate can be unbolted and swivelled to a desired angle on either side to make the tool head inclined with the vertical for machining inclined surfaces.

In front of the slide is provided the apron which carries the clapper box at its bottom. The clapper block carrying the tool holder is hinged about this pin such that in the forward stroke of the ram, it gets a rigid support at its back by being abutted against the vertical surface of the clapper box and in the return stroke, it swings outwards to prevent scratching of the work by the tool.

TABLE SUPPORT:-

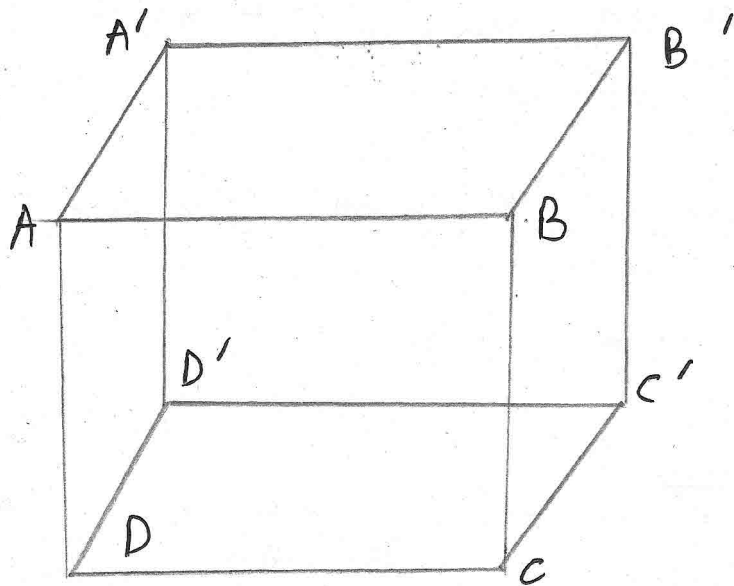
The frame or column of the machine carries two parallel vertical ways, accurately machined and scraped, at its front. On these ways is mounted the cross rail which can slide up and down along the frames. The table is mounted on the cross rail and can slide in a direction normal to the direction of the tool travel, along the horizontal ways H_1 & H_2 provided at the front of the cross-rail. The saddle carries a nut inside it, through which passes the cross feed screw C . To give cross feed to the table, the screw C is rotated by means of a table handle. The same rotates at its own position & moves the table through the nut provided in the saddle. Both hand and power feeds can be used for the cross feed of the table.

STOP PINS:-

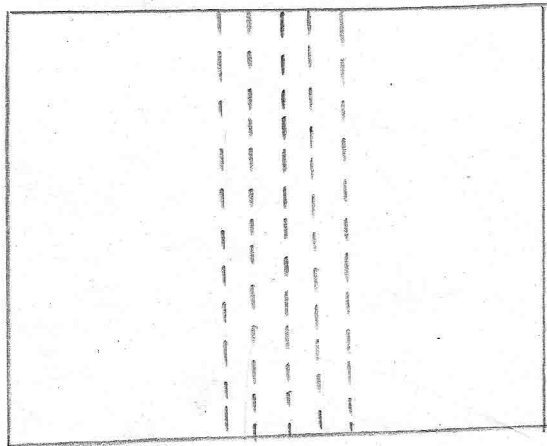
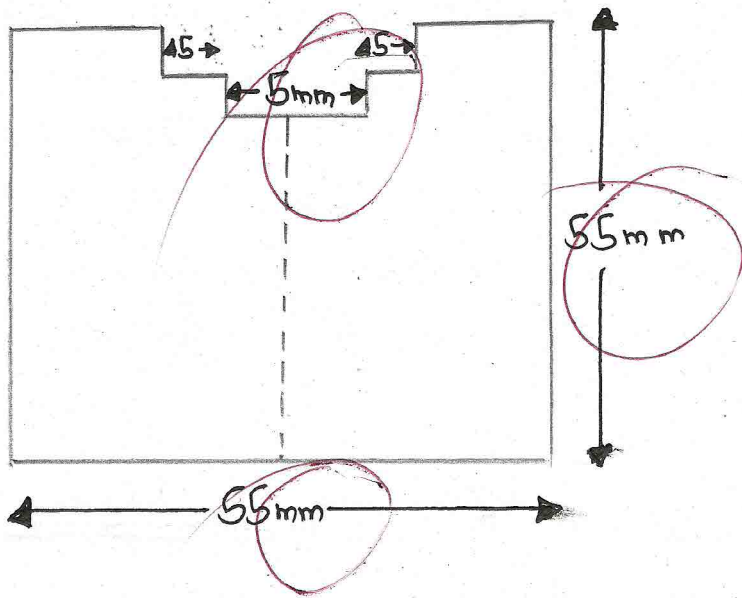
A stop pin consists of a cylindrical body with its diameter reduced at the lower side to suit the width of the table slot. A more useful form of a stop pin is the one having a square head and a round projection at the bottom. It will have a screw with its axis either horizontal or inclined.

TOE - DOGS:-

When very thin pieces are to be held, toe-dogs are used in conjunction with the stop pins. On each side of the work, the stop pins are fixed in the machine table and the toe-dogs are forced against the work by tightening the screws of the stop-pins. The ~~be~~ rear ends of the toe-dogs are provided with the blind holes to accommodate the end of the stop pin screws.



WORKPIECE



PROCEDURE:-

HORIZONTAL CUTTING:-

It is the most common operation performed on a shaping machine. In this, the work is fed in a horizontal direction under the reciprocating tool and the surface produced is horizontal and flat. For this, the work is either held in a vice or clamped directly on the machine table.

It is set at proper inclination and at correct height above the work. The depth of cut is adjusted and the machine started. Cross feed to the table is given initially by hand, till the cut starts. After that power feeds, the machine is stopped and the work inspected. If more material is to be removed, the procedure is repeated till the desired surface is obtained.

PRECAUTIONS :-

- 1- Always keep the machine perfectly clean and thoroughly oiled.
- 2- Take care that no chips remain on the workseat, otherwise the work will not be clamped directly.
- 3- Let the tool set to the correct angle, according to the operation to be done.
- 4- Check up all the controls of the machine before starting the operation.

REFERENCES :-

- "A Course in Workshop Technology Vol. II" by B. S. Raghuvanshi.
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