FITTING SHOP

Introduction

Bench working involves the use of hand tool for performing various operations such as cutting, scraping, threading etc. on metal pieces. Fitting involves aligning and assembling of finished parts in position.

The operation results into some assembly of machine Fitting work involves bench working operation for cutting and finishing the metal parts to ensure required fit between the mating components to fulfill functional requirements during service.

Tools

Tools may be defined as the device used to carry out different operations in fitting shop like cutting, filling etc. Tools may be classified further into following types on the basis of applications of tools.

1) Holding Device

It is used holding the job in appropriate position firmly.

Vice- The job is supported and holding in between the jaws. The vice may be classified in to following types.

(a) Parallel jaw bench vice

(b) Pipe vice

(c) Leg vice

(d) Hand vice

(e) Machine vice

(f) Pin vice

Parallel Jaw Bench Vice- This vice is generally used after mounting on bench and its jaws are parallel to each other. Generally, it is used to support and holding jobs during filing, chipping and hack sawing etc. The main parts of parallel jaw bench vice are.

(a) Fixed jaw (Grey cast iron)

(b) Movable jaw (grey cast iron)

(c) Jaw Plate (tool steel)

(d) Spindle (mild steel)

(e) Handle (mild steel)

(f) Box nut (gun metal)

2) Measuring Tools

This tools used for taking measurement or checking dimensions are called measurement device. As per the measuring methods tools may be classified into following types.

(i) Direct measurement tools

(a) Scale

(b) Vernier caliper

(c) Micrometer

(d) Feeler gauge

(e) Screw pitch gauge

(ii) Indirect measurement tools

a) Calipers- These are indirect measuring tools used to measure or transfer liner and radial dimension for ex-length, width, height & diameter etc. calipers may be further classified as outside caliper (used for outside measurement) Inside caliper (use for inside Measurement) Odd leg caliper (used for making center of circular object) and driver.

b) Try square- It may define as a measuring and marking tools for 90 angles. It's generally made of hardened hand tempered low/high carbon steel.

3) Marking Tools

Marking is necessary to achieve desired dimension before doing any operation its works as a basic reference during various operations with job. The marking tools are-

(a) Temporary Marking tools. The marking which is done for a short duration is known as temporary marking.

(b) Scriber- It is made up of hardened and tempered carbon steel. Tip of scriber is grinded at 12 to 15 degrees and is generally available in 125 mm to 250 mm it is used for temporary marking. scriber is of two types single ended & double ended.

(c) Permanent marking tools. The marking which is done for permanently is known as permanent marking.

(d) Punch- It is used for permanent marking and it is made up of hardened and tempered high carbon steel. It is specified by it is length and diameter of center punch. They may be further classified as center punch (90 angle), Dot punch (60 angle), Prick punch (30 angle).

4) Cutting Tools

(a) Chisel- It is used for cutting surplus material from any object which is generally difficult by hack sawing. It is made by low carbon and high carbon steel depending upon material of job. It is specified by it is width of cutting edge and total length. They are classified into two types- cold chisel and hot chisel.

(b) Hacksaw - It is made up of case hardened mild steel in "c" shape (hacksaw frame) having a wooden handle and a wing nut used for tightening the blade. The process of cutting by it is called sawing. They are classified into three type adjustable frame, fixed frame and deep cutting frame.

(c) Blade- It is metal strip having two holes' end and cutting teeth at one side in length. It is used to cut any material after fixing in hacksaw frame it is made of high carbon steel, high speed steel and low carbon steel It is hardened and tempered.

(5) Finishing Tools

(a) Scraper- It is to remove high spot on the finished surface. It is made up of hardened and tempered tool steel. It may be classified in three types as per their shape as flat scraper, half round scraper & triangular scraper.

(b) File- It is fine cutting tool having number of cutting teeth on it is face and it is used for finishing purpose. Process of metal removing by this tool is called filling. It is made up high carbon steel and cast steel. Except of tang all body is made of hardened and tempered. Files are classified according to their shape, cut & grade as given under.

<u>According to shape</u>- Flat file, Half round file, Triangular file, Knife edge file, Square file, Diamond file.

<u>According to cut</u> - Single cut, Double cut, Rasp cut.

<u>According to grade</u>- Rough file (8 TPC), Basted file (12TPC), Second cut (16TPC), Smooth file (20TPC), Dead smooth file (40 TPC). T.P.C stands for teeth per centimeter.

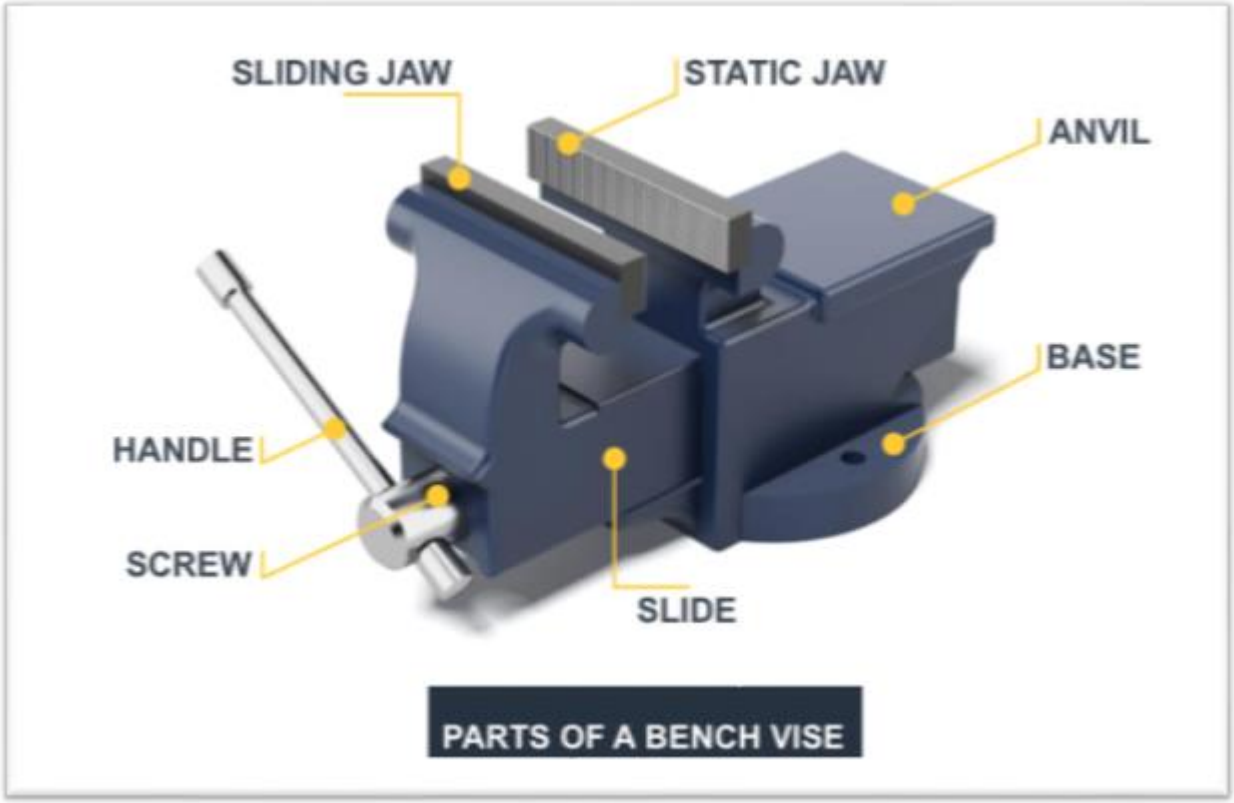

Fig. 1: Bench Vise

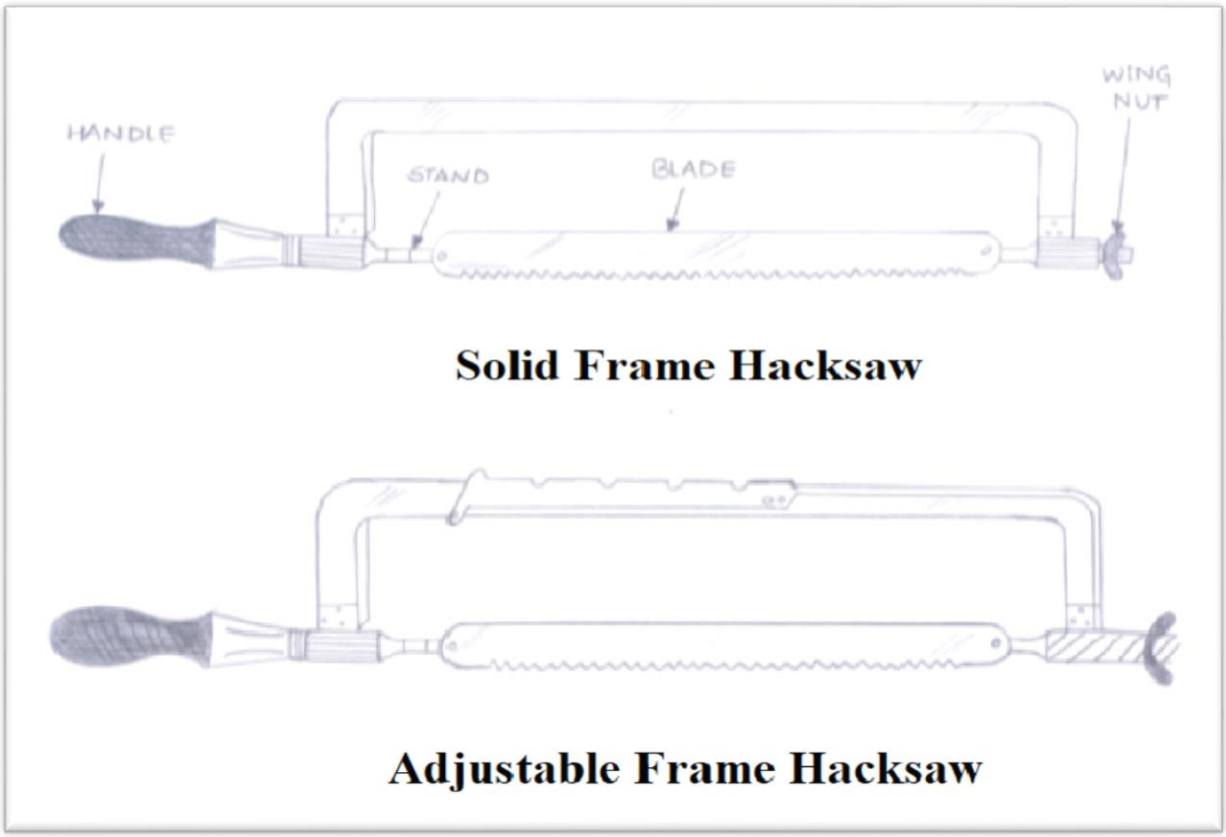

Fig. 2: Single & Double Cut File

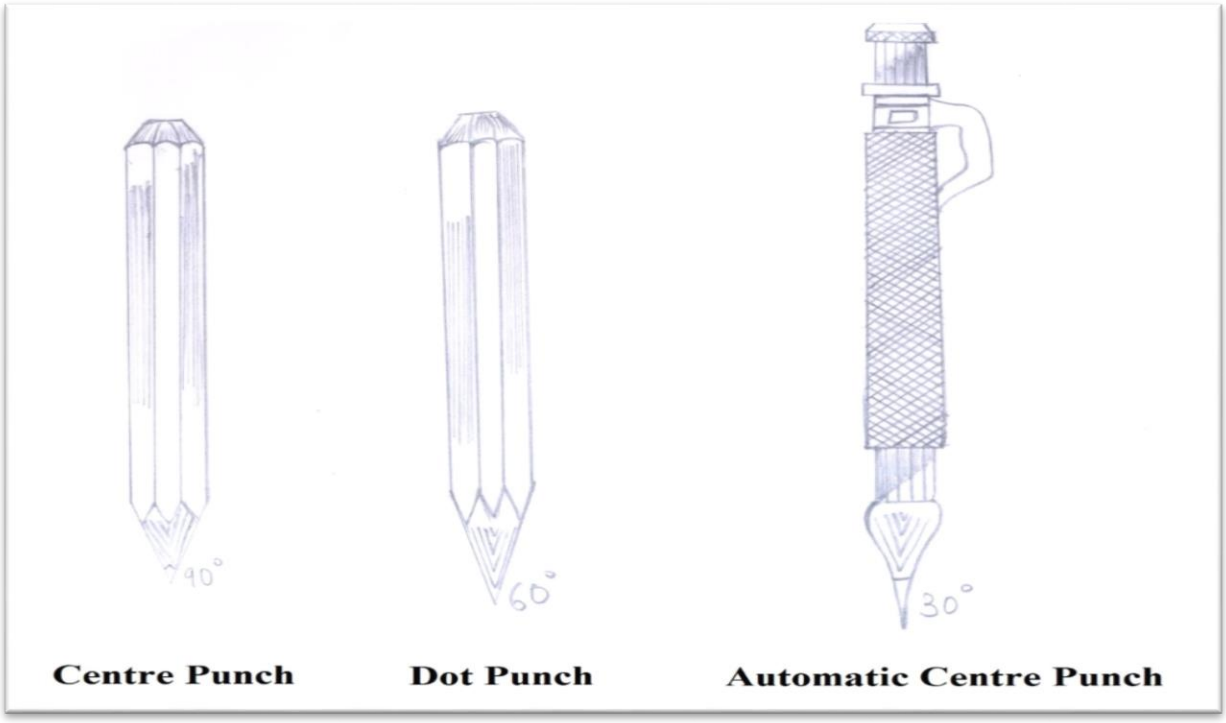

Fig. 3: Types of Punch

PRACTICAL NO. - 01

OBJECTIVE

To make a square piece of mild steel of (48 × 48 × 5) mm.

MATERIAL REQUIRED

Mild steel piece of dimension (48 × 48 × 5) mm.

TOOLS REQUIRED

Steel scale, scriber, Bench vice, Hacksaw, Flat file, square add leg caliper, Dot punch, Ball pin hammer.

PROCESS INVOLEVD

1. Measuring
2. Marking
3. Hack sawing(Cutting)
4. Filling(Finishing)

PROCEDURE

1. First of all, it is checked whether the raw material to be used is sufficient to require the described dimensions as shown in drawing.
2. It is checked that the raw material is free from any unwanted particles such as rust on any layer.
3. The mild steel flat piece is held in the parallel jaws of bench vice so that the main portion should remain inside the vice about 5mm part remaining above the job.
4. Filing is done to make side uniformly flat and is checked properly with the try square.
5. A uniform casting of chalk piece is carried out on a square piece. Late it be dry.
6. Assuming the already prepared angled side as reference side, marking is carried out with the help of scriber and dot punch for remaining two sides filling job.
7. Filling is carried out, till the described dimensions (48mm×48mm×5mm) are achieved.

PRECAUTIONS

1. Work piece should be gripped firmly during working.
2. The tooth of the fil is cleaned firmly during working.
3. During filling, the file should be dragged over the job and maintained horizontally straight.
4. Blade of hacksaw should be checked for highness and direction of teeth.
5. During tightening always keep margin for filling.

RESULT

We performed Fitting operation of Mild Steel work piece.

RESULT ANALYSIS

Changes in dimensions (length, width, dia, weight etc.).

LEARNING OUTCOMES

What did you learn in this practical?

APPLICATION

Where we can apply the knowledge gained in this practical.

SUGGESTIONS

If you have any suggestion related to this practical, please advise.

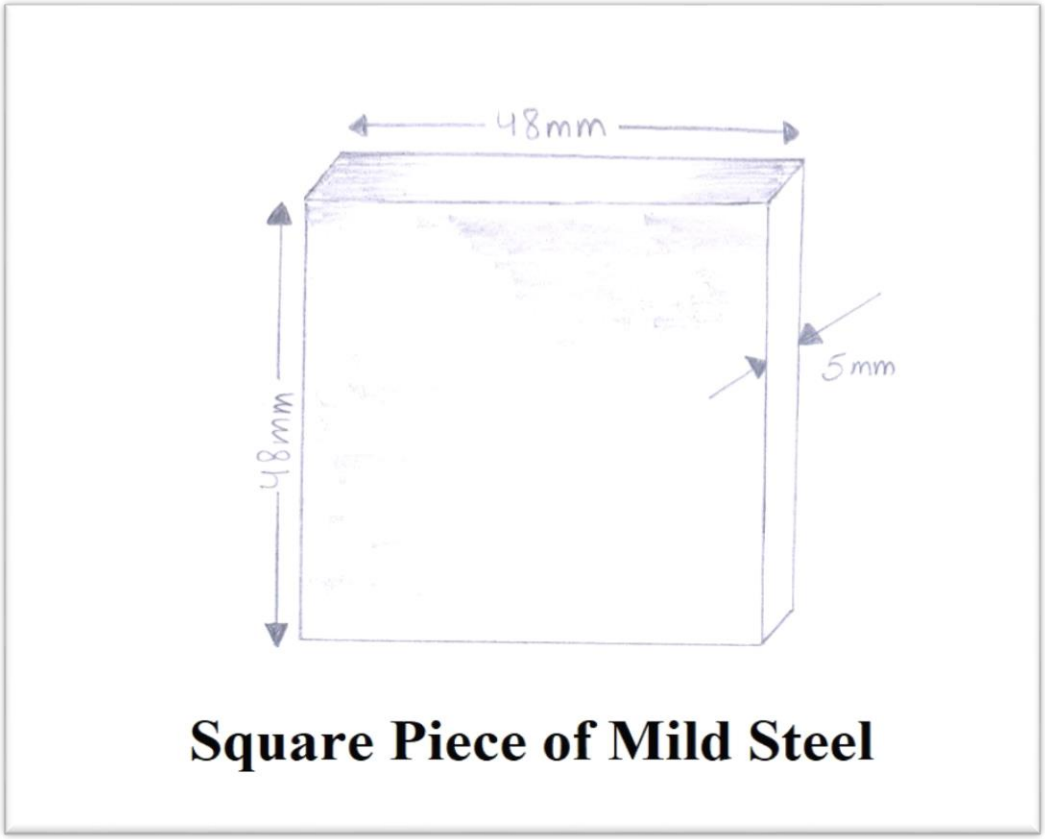

Fig. 4: Square Work-Piece

PRACTICAL NO – 2

OBJECTIVE

To make a fitting job as per sketch given in figure.

MATERIAL REQUIRED

Mild steel piece of dimension (48 × 48 × 5) mm.

TOOL REQUIRED

Steel scale, divider, odd leg caliper, scriber, dot punch, cross pin hammer, bench vice, hand hacksaw, 300mm rough flat file, semi round file, anvil.

PROCEDURE

1. The given material is checked for 48mm×48mm square dimensions.
2. The edge of the M.S. flat is filled to straightness and checked with try square.
3. A second adjacent edge is also filled such that its square to the first one.
4. Then the surfaces are make at 48mm from these two edges using odd leg calipers and steel rule after applying while check on the surface and drawing.
5. The work piece should be tightly fitted in the holding device (bench vice).
6. Filling is done to make 48mm×48mm×5mm.
7. Now the portion to the removed is make.
8. Using dot punch, punching is done along the lines indicating the material to remove.
9. Each material is out with a hacksaw and filed such that it is well within the part.
10. Make with the help of odd leg caliper 20mm from top and 13mm from left to right and left on both side of the work piece.
11. With the help of hacksaw cut the marked parcen and with the help of rough file and make the perfect 90 and check with try square and smooth the sides of the work piece.
12. For inside radius (R-15 mm) removed excess material marked by hacksaw and then do filling 300 mm round rough file to dimension it.
13. For outside radius (R-10 mm) removed remove excess material marked by hacksaw and then do filling 300 mm rough flat file to dimension it.

PRECAUTIONS

1. Work piece should be gripped firmly during working.
2. The tooth of the file is cleaned firmly during working.
3. During filling the file should be dragged over the job and maintained horizontally straight.
4. Blade of hacksaw should be checked for highness and direction of teeth.
5. During tightening, always keep margin for filling.

RESULT

We performed Fitting operation of Mild Steel work piece.

RESULT ANALYSIS

Changes in dimensions (length, width, dia, weight etc.).

LEARNING OUTCOMES

What did you learn in this practical?

APPLICATION

Where we can apply the knowledge gained in this practical.

SUGGESTIONS

If you have any suggestion related to this practical, please advise.

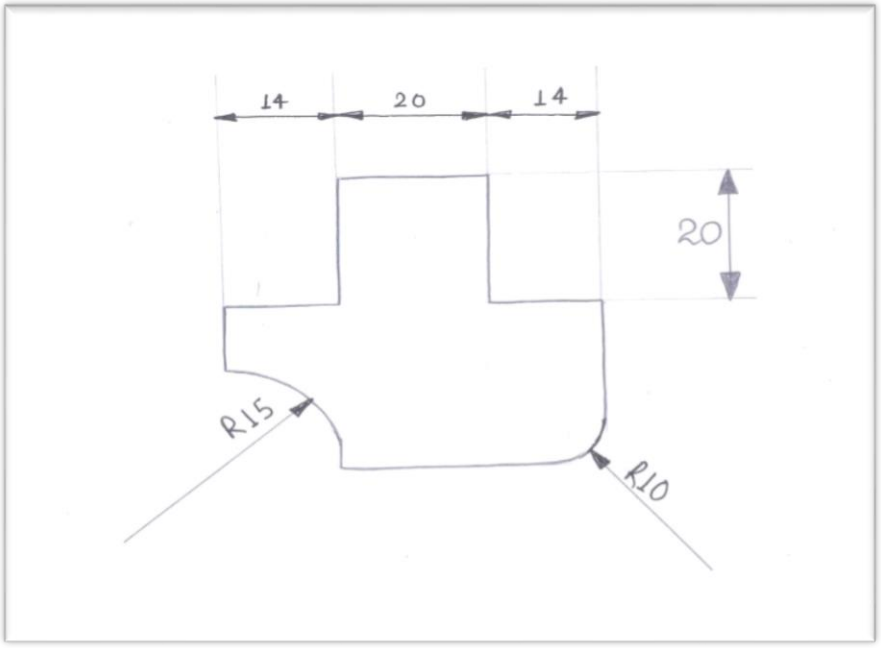

Fig. 5: Required Dimension of Work piece