BE7102 Workshop Practice (0-0-3) Prepared by Dr Dhiren K Behera

Fitting Practice: Use of hand tools in fitting, preparing a male and female joint of M.S. or making a paper
Weight of M.S.
Welding Practice: Gas welding & Electric Arc welding Practice.
A joint such as a Lap joint, a T-joint or a Butt joint is to be prepared or to make furniture.

Machining:

(i) Stepped cylindrical Turning of a job and Thread-cutting in lathe.
(ii) Shaping (iii) Milling

Reference:

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FITTING SECTION

INTRODUCTION: In engineering, particularly in heavy and medium engineering, even today with the use of automatic machine, bench work and fitting having important rules to play to complete and finish a job to the desired accuracy .Although majority of work can be finished to fairly good degree of accuracy in a reasonable time through various machining operations they still requires some operation to be done on then to finish the job by hand.

The term 'Bench work' generally denotes the production of an article by hand on the bench .Fitting is the assembling together of parts and removing metals to secure the necessary fit and mayor may not carried out at the end of the bench .The operations commonly used in Fitting are-

1. Chipping
2. Fitting
3. Scrapping
4. Grinding
5. Sawing
6. marking
7. Drilling
8. Reaming
9. Tappling

Workshop is a place where man ,machine and material work together to produce some useful goods .Thus workshop is grounded into three sections according to the produce of work items they produce and machines used;-(i)Carpentry section,(ii)Fitting section,(iii)Blacksmith section.

SAFETY PRECAUTIONS:

Before working in a workshop one must be well aware of danger .Hence before entering into a workshop one must obey by the

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FITTING SECTION

safety rules of workshop .Following safety rule in a workshop is very essential without which working in a workshop may cause danger .Therefore all are bounded to adopt safety rules before entering workshop in order to avoid chances of accident .The workshop safety rules thus categorized:-

1 .Personal safety

2. Machine and tool safety

3. Building safety

PERSONAL SAFETY:-

Personality safety rules are the rules that deal with the safety of the worker itself .These are:-

*One must wear light dress

*One must not wear watches

*One must wear goggles while chipping

*One must wear full shoes

*One must not play with machines which is working

*One should maintain discipline in workshop and should keep clean the workshop

MACHINE SAFETY:-

The workshop workers should be careful while handling the machines in the workshop .The machine plays a vital role while working in the workshop .So proper care of these must be taken .The following are the precaution:-

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FITTING SECTION

*One should not start any machine before getting information and knowing it's function.

*One should not operate a machine which is near to him.

*One should not work with unguarded machine.

BUILIDING SAFETY:-

Building is the most important place of workshop .All jobs are carried out in the building .Therefore proper care of building should be taken .The building must have proper facilities for the performance of jobs .The safety of building precautions are:-

*The length of building should be very high.

*The building should have huge breadth.

*There should be proper lightening in the room.

*There should be proper ventilation.

*The environment should be healthy.

*The floor of workshop must be kept clear.

VICES:-

The vice is the most commonly used tool for holding work.

Various type of vices are:-

1.BENCH VICE:-

The most commonly used is the engineer's parallel jaw bench vice ,sometimes called fitter's vice .It must be firmly fixed to the bench with

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FITTING SECTION

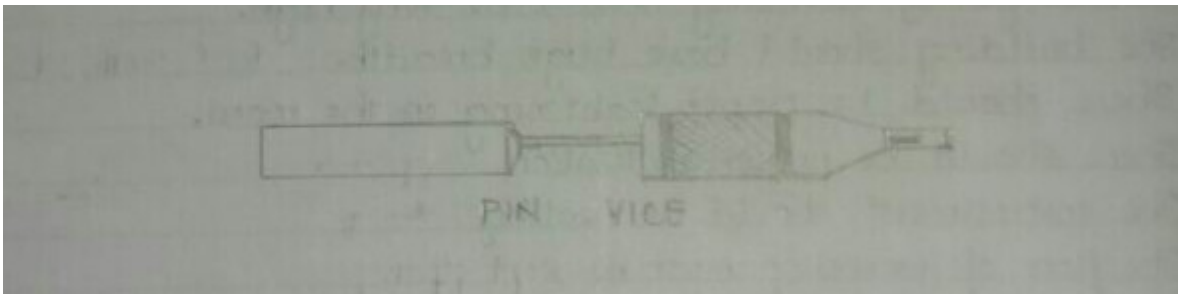
coach screws or with nuts and bolts .The vice essentially consists of cast iron body ,a fixed jaws ,a movable jaw batch made of cast steel ,a handle ,a square threaded screw and a nut ,all made of jaw plates are fixed to the jaw by means of set of screws and they can be replaced when worn out.

2. LEG VICE:-

The leg vice is used by blacksmith but it is also suitable for heavy hammering ,chipping and cutting on filter's work .The vice secured to the top of bench by a strap which is fastened to the bench leg with staples and its ends fit into a hole in the floor .The construction of the vice makes it suitable for heavy work.

3. PIPE VICE:-

The pipe vice is used for holding round section metal ,tube pipes etc. the screw is vertical and the movable jaw works vertically .It grips the work at four points on its surface .



4. HAND VICE:-

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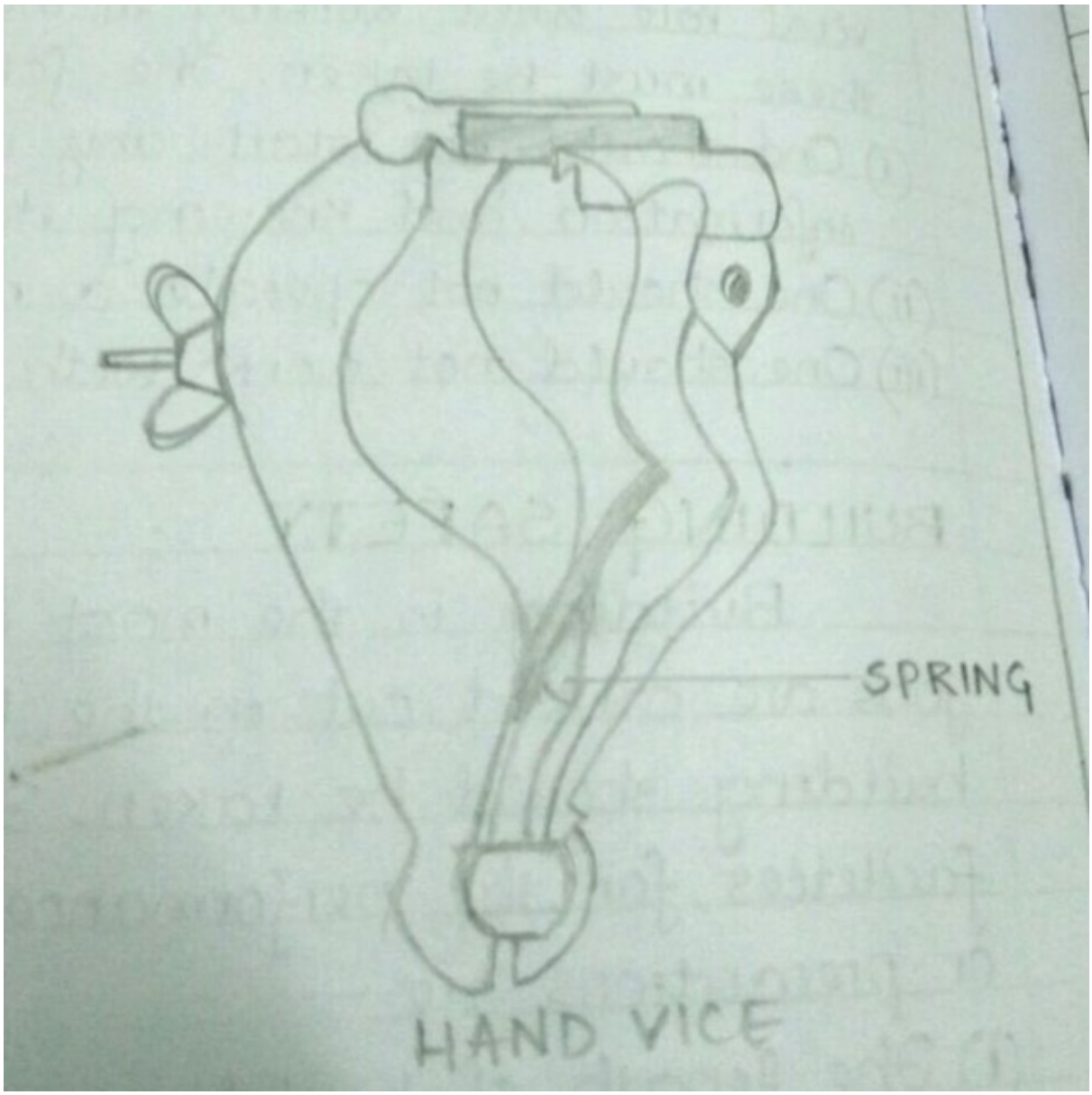

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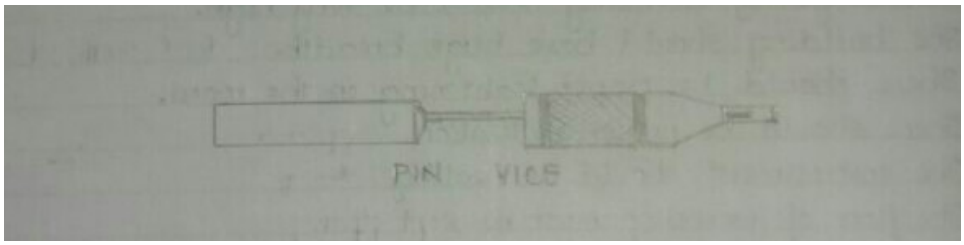
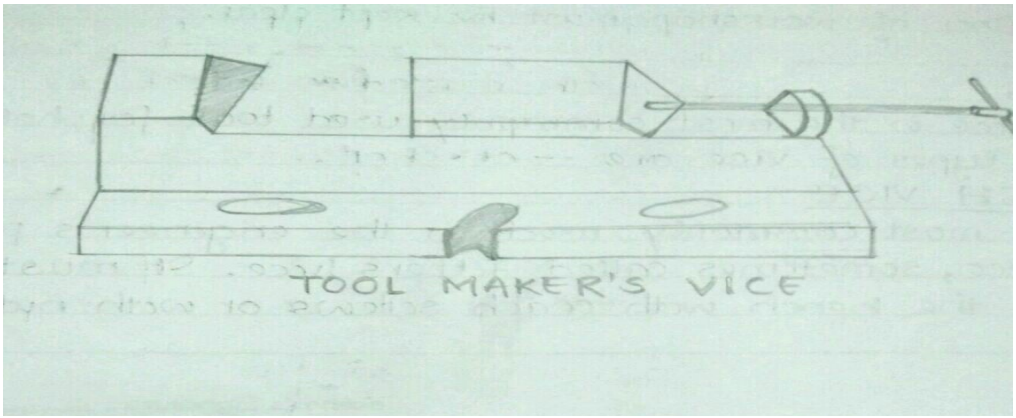
5.PIN VICE:-The pin vice is used for holding round material of small diameter such as wire and pins ,during working .It also forms a very useful handle for small vice.



6. TOOL-MAKER'S VICE:-

The tool maker's vice is particularly useful for holding small work which requires fitting or drilling and for such work as laying out small jobs on the surface plate .It is made of mild steel.



HAMMER:-

Hammer are used to strike a job .They are made up of forged steel or various sites and shapes to suit various purposes .Its suitable range would be

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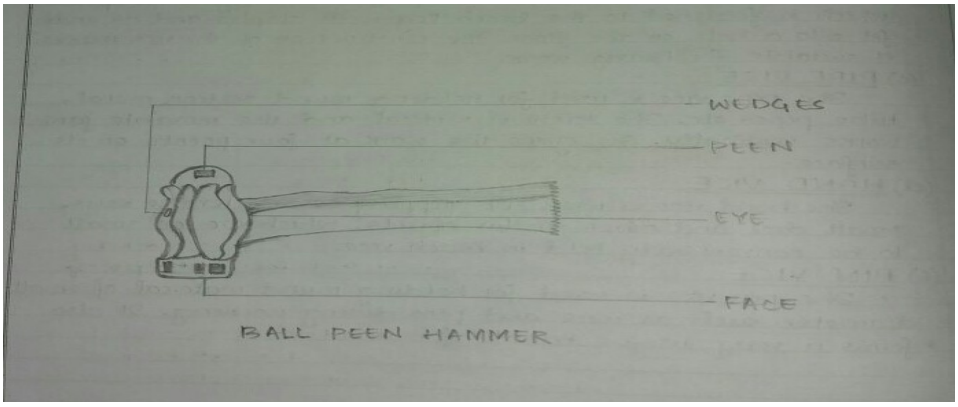
FITTING SECTION

0.11 to 0.33 kg for light work ,such as clinching small velvets and dot punching ,0.45 kg required for chiselling and 0.91 kg for heavier work such as chipping .

A hammer consists of four party parts namely peen ,eye and face .The eye is normally made and this is oval or spherical in shape and this is oval or spherical in shape and it accommodates the handle or shaft which fits into the eye is spread or spilt by forcing a metal wedge into it to prevent the hammer head from firing off the handle during striking.



Different types of hammer are:-

1. BALL PEEN HAMMER:-

The most common form of hammer is ball peen hammer and is sometimes called engineering hammer or chipping hammer .The peen has a shape of ball which is hardened and polished .The size of this hammer varies from 0.11 to 0.91 kg.

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FITTING SECTION

2. CROSS PEEN HAMMER:-

This is similar to ball peen hammer in shape .It is used for bending, stretching, hammering into shoulders inside curves etc. .The size varies from 0.22 to 0.91 k g.

3. STRAIGHT PEEN HAMMER:-

This hammer has a peen straight with the shaft, i.e. parallel to the axis of the shaft .This is used for stretching or peening the metal.

4. MALLET;-

Where it is necessary to the strike metal a blow with the minimum damage to the surface, a soft hammer called mallet is used .They are made of hard rubber, copper, brass or most commonly wood.

CHISEL:-

Chisel are used for cutting and chipping away pieces of metal and are made of carbon steels usually rectangular, hexagonal or octagonal cross section .They are forged to shape roughly ground and then hardened and temperature .The chisel is subdivided into cutting edge, shank edge and head and this is generally specified by the length and width of the cutting edge is also required to completely specify a chisel .Apart from the cutting, angles that can be specified for a chisel are:

- Ralse angle
- Forging angle

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FITTING SECTION

- Clearance angle

The five most common type of chisels are:-

1. FLAT CHISEL:-

The flat chisel is the most common of all the chisel .It is the chisel which is used for most of the general chipping operations .It may be used for removing surplus metal from surfaces of jobs .The flat chisel should be drawn down to the shape .The cutting edge should be drawn slightly curved as shown as this will prevent the corners digging in when it is being used .Its length varies from 100 to 400 mm, while the width varies from 16 to 39 mm.

2. CROSS OUT CHISEL:-

The cross out chisel is used for cutting grooves in large surfaces previous to using the flat chisel .The cutting edge is slightly wider than the supporting metal to provide clearance .Its length varies from 100 to 400 mm and width varies from about 4 to 12 mm .

3 .HALF ROUND CHISEL:-

The half round chisel is useful for cutting oil ways or grooves .In bearing bases and pulley etc. They are also used for setting over pilot holes when a hole is to be drived .

4 .DIAMOND POINT CHISEL:-

The diamond point chisel is used for cutting grooves clearing corners and squaring small holes .

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FITTING SECTION

5 .SIDE CHISEL:-

This is particularly useful in chipping and removing the surplus metal in cutter ways and slots which may have to be acted by the hand after having been drilled .

CHIPPING:-

It is the process of removing thick layers of metals by means of odd chisels .On chipping work ,the job is firmly held in a vice and the metal is removed by striking the chisel on the surface of the workpiece by a hammer .The hammer shaft should be brought up square with the body and nearly to the shoulder to ensure sufficient power in the blows .In removing large volume of metal frequently lubrication of the cutting angle will be necessary to ensure long tool life and to make the cutting action quicker and smoother .While chipping ,the operator should always keep his eyes on the cutting edge of the tool and not on its hand .

FILES;-

It is the most widely used equipment in workshop .A file is a hardened piece of high grade steel with slanting raws of teeth .It is used to cut ,smooth or

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fit metal parts .It cuts all the metals except hardened steel .Files are classified into various parts according to the principal factors ,size ,type .Most commonly used files are:-

- Flat Files
- Hand Files
- Square Files
- Pillar Files
- Round Files
- Triangular Files
- Half round Files
- Knife edge Files

*FLAT FILE:-

These are tapered in width and thickness and are the most commonly used files for general work .They are always double cut on the faces and single cut on the edges .

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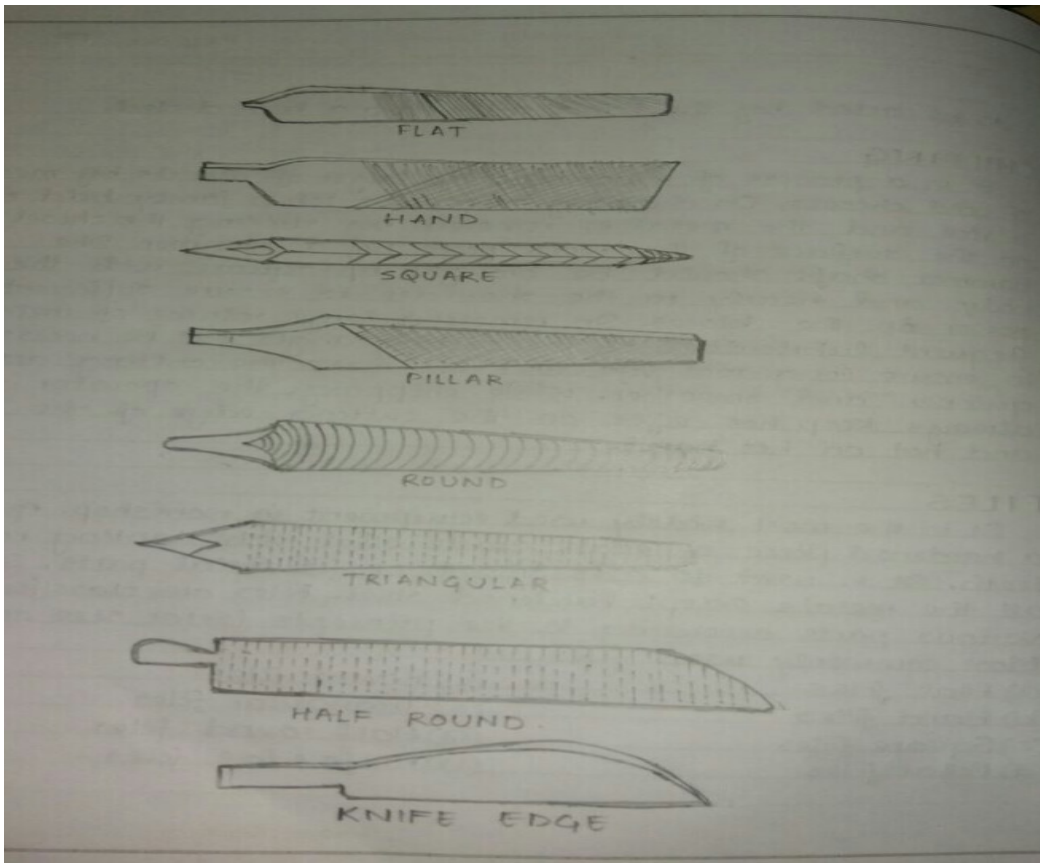

*HAND FILE:-

This is parallel on its width and tapered in thickness .It is used for finishing the flat surfaces .It has one edge and are always double cut.

*SQUARE FILE:-

This is a square in section, double cut and tapered towards the point .This is used for filing square corner enlarging square or rectangular opening as splines and keyways.

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*ROUND FILE:-

They are round in cross section and usually tapered when they are termed as rat-tailed .When parallel they are described as parallel round .Round files are used for filing curved surfaces and enlarging round holes and forming fillets.

*TRIANGULAR FILE:-

Three square or triangular files are tapered, double-cut and the shape is that of an equilateral triangle .They are used for rectangular cut and filing corners less than 90 degree.

*KNIFE EDGE FILE:-

This is used and shaped like a knife, tapered in width used filing narrow slots, grooves and notches.

Hacksaw

The hacksaw is used for sawing all metals except hardened steel. A hacksaw consists of a frame handle prop tightening screw and nut blade. The frame is made to hold the blade tightly. They are made in two types: the solid frame in which length can't be changed and the adjustable frame which has a back that can be lengthened or shortened to hold blades of different length.

Solid Frame Hacksaw

Hacksaw blades are made of special steels for hand saws either high carbon steel low alloy steel or high speed steels is used. All hard blades made of high

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FITTING SECTION

speed steel are used for cutting the harder metals such as alloy steels while flexible blades are less liable to break and are used for general work.

Power Hacksaw

The power hacksaw is very similar to the hand hacksaw with the addition of a suitable driving mechanism the drive is either given a belt from a line shaft or by an enclosed motor. Suitable mechanisms are provided whereby length of the stroke and the weight applied may be varied.

1. MARKING TOOLS

The following tools are used for making:

(a) Surface plate

(b) Scriber

(c) Punch

(d) V- block

(e) Angle plate

(f) Try square

Surface Plates

The surface plate is used for testing flatness of work itself and is also used for making out work. This is used for small pieces of work while marking out table is used for larger jobs.

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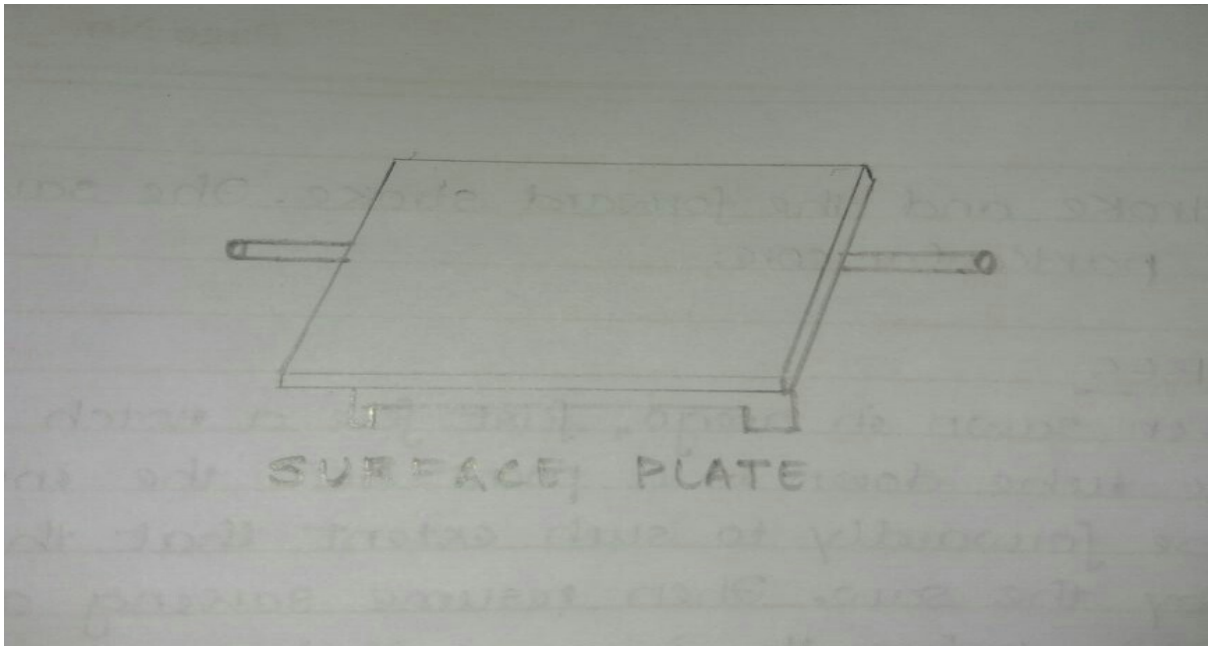
Surface tables are made of grey cast iron and of solid design or with ribs. They should be well and reflection free illuminated and rest horizontally on a firm support, the height being about 800 mm from the floor.



Scriber

The scriber is a piece of hardened steel about 150 to 300 mm in length and 3 to 5 mm in diameter pointed at one of both ends like a needle. It is held like a pencil to scratch or scribe lines on metal. The bent end is used to stretch line in places where the straight and cannot reach. The ends are sharpened on an oilstone when necessary.

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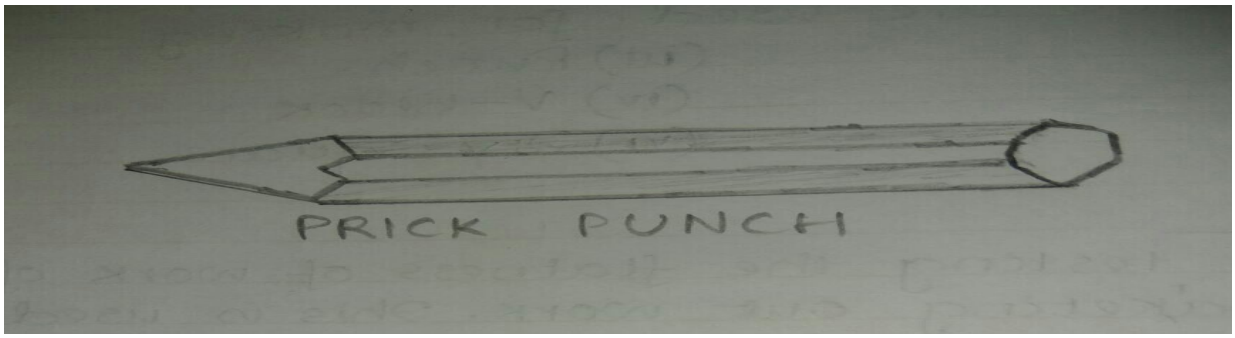
Prick Punch

The prick punch is a sharply pointed tool. The tapered point of the punch is sharply angled at usually 40. It is used to make small punch marks on layout lines in order to make them last longer .



Centre Punch

The centre punch looks like a prick punch. Its point has an angle more obtuse than that of the prick punch point this angle usually being 60". The centre punch is used only to make the prick punch marks larger at the centres of holes that are to be drilled.

V-Block

The V-block of steel with V-shaped grooves. Roundly shaped workpieces which are to be marked or drilled are firmly supported in a horizontal position and can't rotate easily.

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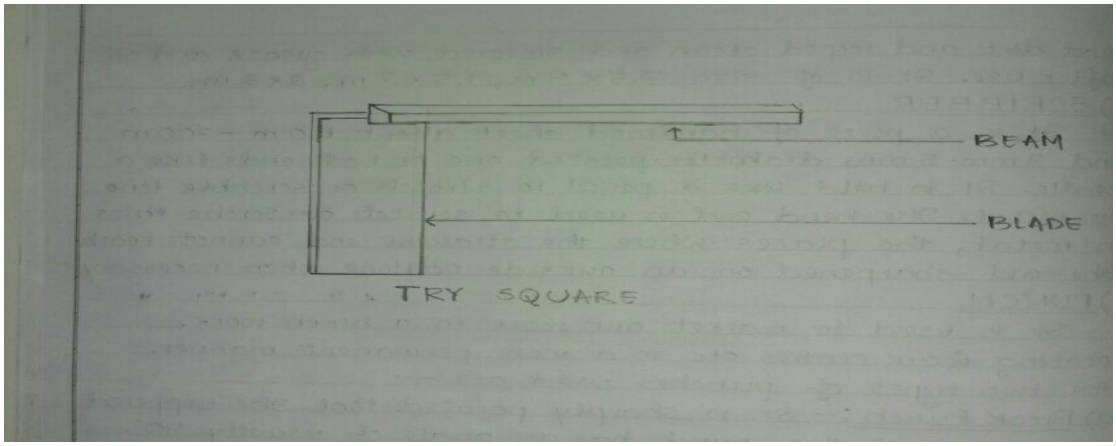
FITTING SECTION

Angle Plates

The angle plates which is made of grey cast iron has two plane surfaces at right angles to each other. This is used in conjunction with the surface plate for supporting work in the perpendicular position. It has various slots in it to enable the work to be held firmly by bolts and damps.

Try Square

The try square is made of one-piece, both blade and beam. This is used when it is necessary to get another edge or surface exactly at right angles to an already trued edge or surface and also for laying out work. The sides and edges of any square may be tested by placing the beam of the square against the straight edge.



BE7102 Workshop Practice (0-0-3) Prepared by Dr Dhiren K Behera
Fitting Practice: Use of hand tools in fitting, preparing a male and female joint of M.S. or making a paper
Weight of M.S.
Welding Practice: Gas welding & Electric Arc welding Practice.
A joint such as a Lap joint, a T-joint or a Butt joint is to be prepared or to make furniture.
Machining:
(i) Stepped cylindrical Turning of a job and Thread-cutting in lathe.
(ii) Shaping (iii) Milling
Reference:
1. Elements of Workshop Technology, Vol. I and II by Hajra choudhary, Khanna Publishers
2. Workshop Technology by WAJ Chapman, Viva Books
3. Workshop Manual by Kannaiah/ Narayana, Scitech

FITTING SECTION

1.MEASURING INSTRUMENTS

Steel Rule

It is one of the most useful tools for taking linear measurements of blanks and articles to an accuracy of range from 1.0 to 0.5 mm. It consists of a strip of hardened steel having line graduations etched or engraved at interval of fraction of a standard unit of length. Depending upon the interval at which the graduations are made the scale can be manufactured in different sizes and styles.

Divider

The tool is used for transferring dimensions. Scribing circles, and doing general layout work. In practice one point is placed in the centre top making the exact centre, and the circle or arc may then be scribed on the joint with the other point. The size is measured by the greatest distance it can be opened between the leap. Thus, a 100 mm divider open 100 mm between the points. Steel scale must also be used with this instrument.

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FITTING SECTION

JOB

AIM OF THE EXPERIMENT:

To prepare a square paper weight.

RAW MATERIAL:

*M.S. Flat

*M.S. Rod

TOOL REQUIRED:

*Steel Rule

*Hack Saw

*Flat File

*Scriber

*Surface Plate

*Drilling Machine

*V-block

*Try square

*Centre Punch

*Bench Vice

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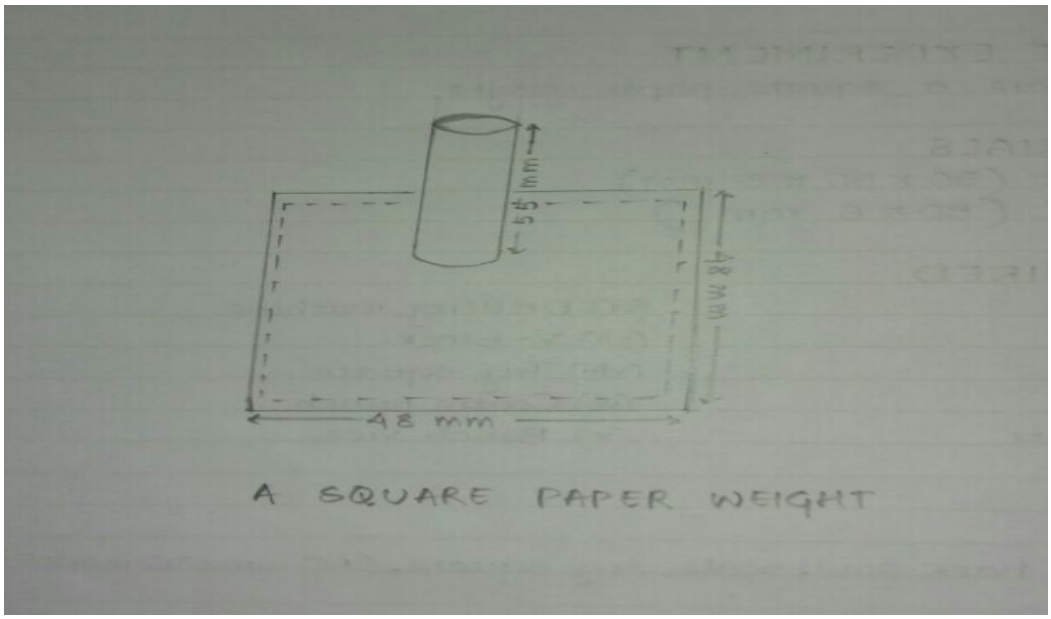

PROCEDURE:

Step 1:-

By using hacksaw, scale, try square, 50*50*50 was cut down.

Step 2:-

It was filed to make right angles so that no light beam passed through the edges.

Step 3:-

The metal square was considered and scribed by scale, scriber and try square.

Step 4:-

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FITTING SECTION

A dotted mark was given by punch and hammered to make 50mm*50mm square.

Step 5:-

The rod was obtained into the hole of the square by the help of bench vice.

Step 6:-

The paper weight was prepared and was covered with a layer of machine oil to avoid rust.

CONCLUSION:

The job was completed safety and was submitted to the instructor.

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