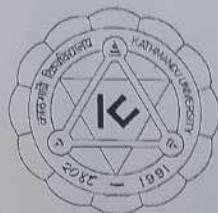


**Report on
Engineering Project Preparation and
Workshop Practice
(ENGG 101)**



Submitted Required
Name: Nations
Roll No: 101
Group: Materials Required
Department: Mechanical Engineering

a) Date of Performance:
24th March, 2023.
Date of Submission:
13th April, 2023

Submitted to:
General Mechanical Workshop
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Dhulikhel, Kavre.

Report on
Engineering Project Preparation and
Workshop Practice
(ENGG 101)



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CARPENTRY

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Introduction

Carpentry is the operation of wood working. Simply, it is the working on wood to create a common furnishing assets. It was done to make the base of the K.U Logo. It provided the base for it to stand on itself. In this case, KU logo is inserted through drilling. Carpentry is one of the most common practice which is used in our daily activities.

Objectives

The objective of this work is to develop the skills of carpentry. We will have knowledge on the different kinds of the tools used. It helps to sharpen our minds and develop the creative skills used for the lifetime. The main objective was to know about the tools and gain knowledge on carpentry skills. The base of the logo was made to join logo part to wooden base in order to make the stand in itself.

Introduction to KU Base

Timber is the basic materials of wood working. It is obtained from the exogenous trees after their full growth. The wood obtained from full grown trees are harvested and seasoning is done to remove the excess moisture. If seasoning is not done the timber may bend and its strength and look overtime. The base is made of the size $60 \times 60 \times 45$, each tier is 15 mm high and the tiers have their size 40×40 and 20×20 respectively.

Applications

The base fitted with KU logo can be used in various ways. In offices, it can be used as paper holder. It is also used as a token of gift and as a decorative item in houses.

Tools Required

1) Marking and measuring tools

a) Steel scale

It is one of the most important tools used in carpentry. It is used to measure the length of the wood. It consists of strip of hardening steel engraved with line graduations.

Mostly, they consist graduation in centimeter and inches.

b) Try Square

It is a L-shaped tool which consists of short stock and blade. Try square is used to make a edge perpendicular to another edge on which the short stocks rest.

2) Holding device

a. Bench Vice

Bench vice is a holding tool used to hold the wood work. It consists of iron body, a fixed jaw and a movable jaw made up of cast iron and a threaded screw made of mild iron. The holding face of jaws are provided with the teeth holding workpiece. The size of the vice is known by the width of the teeth or jaw. The width ranges from 80 to 40 mm.

3) Cutting Tools.

a. Rip Saw

A rip saw is the saw that is especially designed for making a ripcut, a cut made

parallel to the direction of the wood grains. The cutting edge of each tooth has a flat front edge and is angled backward by about 8° . The edges are sharpened at right angles to the cutting plane forming chisel like cutting surfaces.

b. Chisel

A chisel is a tool with a characteristically shaped cutting edge of blade on its edge for cutting or chipping hard materials like wood by striking chiselling materials / involves, forcing the blade down by striking with a mallet. There are different types of chisel i.e. firmer, mortise and many more.

c. Drill

The tools used for making the holes in job pieces in fitting is drill. There are three types of drill:

- i) Flat drill
- ii) Straight drill
- iii) Twist drill

Here, we used twist drill which has an angle of 60° on the top and a hoist type of screw groove on the length of 8mm.

4) Drill Machine

a. Pillar drill machine

It is a vertical tool which is used by fixing it on a bench. It consists of a table where the job piece is kept and drilling is done by moving the operation lever down. The machines contain the control button and motor housing. It also consists the base plate and locking handle.

5) Filing And Finishing Tools.

a. Rasp-cut file.

It is a coarse form of file used in coarsely shaping wood or other materials. Typically, a hand tool, it consists of generally tapered rectangular, round or half round sectioned bar of case hardened steel with distinct individually cut teeth narrow pointed tang is common at the end to which handles is fitted. It removes the wood very quickly without the risk of tearout. It preliminary shapes the wood which is later finished with a plane, a file, a standing stick or sandpaper. Here, we used sandpaper.

b) Sand paper

Sand papers are names used for a type of coated abrasive that consists of paper or cloth, with abrasive material glued to it, silicon carbide or aluminium oxide are commonly used as abrasive. It smoothens the rough surface. It can be different grits 40, 50, 100, 180 and many more. There are also different types of sandpaper such as ceramic alumina, aluminium oxide etc.

6) Cleaning Tools

a. Brush

Brush is used in cleaning purpose. It consists of fibres generally made out of plastic attached to the handle. It is necessary to clean the working area for the another time to reduce the messiness.

7) Painting

The process of coating the job pieces with paint so that external agents like moisture, crumbling could not affect the job pieces is called painting. The materials used for painting are:

a. Paint brush

It is simple kind of brush having bundle of fibres attached to handle. The fibre is arranged in a rectangular bundle.

b. Paint

It is the mixture of different compounds which have adhesive and cohesive force and helps to protect the object from external agent. It also makes the object to look attractive.

Operations

1) Marking

Marking is one of the important step for starting a work. It gives us confirmed structure of the object. We are marking out of all wood. We mark the different dimensions as we are suggested for marking. We use pencil, steel scale and try square in the marking process, to make it precise and accurate.

2) Cutting

In this step, we use rip saw to cut the job piece in a required dimensions made through marking. The job piece is held tightly by bench vice. The rip saw is held tightly over the marks and stroked.

3) Filing

It is the most important operation. It is necessary to give the wooden job proper shape and make it plane and smooth. In this case, to file the wood, rash file is used. It is the finishing operation. No more than 0.5 mm tooling allowance should be left for filing. The file cuts in forward stroke.

4) Drilling

It is an operation of producing circular disc or notes in a wood. The filed job piece is taken into the pillar drilling machine. It is a vertical drill machine having stable base and hole is driven into the job piece mutually so that the pen can be kept in the job piece. It uses a twist drill.

5) Chipping

Chipping is done with the help of chisel. A fairly large number of chisel is used in chipping in different manners to produce desired shape and calcities. To withstand heavy work mortise chisel is used.

6) Striking

Various working tools like chisels and nails need striking from top to drive them to the wood. The tools used for these purpose are light hand hammer, mallet and claw hammers.

Materials Required

Wood of Dimension:

Length :- 60 mm

Breadth :- 60 mm

Height :- 45 mm

Sequence Of Operation

1. The wooden piece of required dimension is taken.
2. The wood is marked to the required dimension by the help of the marking tools i.e. scale, pencil, try square.
3. The job piece was cut by the rip-saw holding it tightly on a bench vice.
4. With the help of the Rasp-file and sand paper, the edge and surface are smoothened.
5. The shaped job piece is marked to find its centre.
6. The shaped job piece is taken to the pillar drilling machine and was held on a holder and positioned below a twist drill and drilled.
7. The sanding was done to smoothen out surfaces using sand paper.
8. The primary coat of the paint was coated and dried. (Red colour was applied)
9. The final coat of the paint was applied and dried.

Safety Measures

1. One should be careful while cutting and filing.
2. One should use the instructions properly provided by the instructor.
3. Always hold the job piece before cutting.
4. Drilling should be done carefully by holding job pieces by a holder.
5. Machines should be turned off after using.
6. Saw teeth need to be used carefully.
7. Apron and gloves should be worn in the workplace.

Quality Control Report

a. Qualitative (Before Operation)

| S.N | Measurements | Measured size | Required size | Deviation |
|-----|------------------------|---------------|---------------|-----------|
| 1. | Length of square base | 50 | 50 | 0 |
| 2. | Breadth of square base | 50 | 50 | 0 |
| 3. | Height of square base | 43 | 45 | -2 |

b. Qualitative (During operation)

| SN | Description | Rating | out of | Remarks |
|----|------------------|--------|--------|---------|
| 1. | Perpendicularity | 4.5 | 5 | Good |
| 2. | Smoothness | 4 | 5 | Good |
| 3. | Dust present | 4.5 | 5 | Bad |

c. Qualitative Rating (After Operation)

| SN | Description | Rating | out of | Remarks |
|----|------------------|--------|--------|---------|
| 1 | Perpendicularity | 4 | 4.5 | Good |
| 2. | Smoothness | 4.5 | 5 | Good |
| 3. | Finishing | 4.5 | 5 | Good |

Qualitative Rating (After)

| SN | Description | Obtained | Required | Deviation |
|----|-------------------|----------|----------|-----------|
| 1. | Length of base 1 | 60 | 60 | 0 |
| 2. | Height of base 1 | 16 | 15 | +1 |
| 3. | Length of base 2 | 41 | 40 | +1 |
| 4. | Height of base 2 | 14 | 15 | -1 |
| 5. | Length of base 3 | 20 | 20 | 0 |
| 6. | Height of base 3 | 14 | 15 | -1 |
| 7. | Breadth of base 2 | 40 | 40 | 0 |
| 8. | Breadth of base 3 | 19 | 20 | -1 |

GANTT Chart.

| SN | Work Parameters | DAY | |
|----|-----------------------|-----|---|
| | | 1 | 2 |
| 1 | Marking and measuring | | |
| 2 | Cutting and drilling | | |
| 3 | Filing and sanding | | |
| 4. | Painting. | | |

Cost Estimation.

1. Cost of wooden piece of pine wood of
60 X 60 sq mm 60 X 48 sq mm.
= Rs 30 per piece.

2. Cost of 1 litres Enamel paint = Rs 320
or, 1000 ml \rightarrow Rs 320
1 ml \rightarrow Rs $\frac{320}{1000}$

Total volume of wood paint (50mls)
= Rs $\frac{320}{1000} \times 50$
= Rs 16

3. Cost of Electricity consumption.
1 unit \rightarrow Rs 10
In drilling practise = 0.25 unit
 \therefore 0.25 unit \rightarrow Rs 10×0.25
= Rs 2.5

4. Labour cost
Involving in work for 1 hour = Rs 75
For carpenting practice = 2.5 hrs time consumed
So, 3 hours = Rs 75×3 = Rs 225/-

Conclusion

The job of carpentry practice was completed with good finishing on time. After completing this job, we learned about different tools, the way to use them and gained the experience of carpentry for further use in the future.

FIGURES

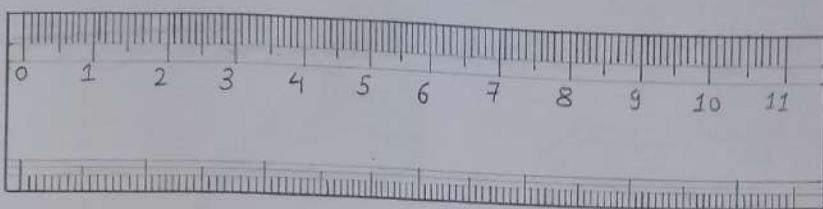


Fig:- Measuring Scale

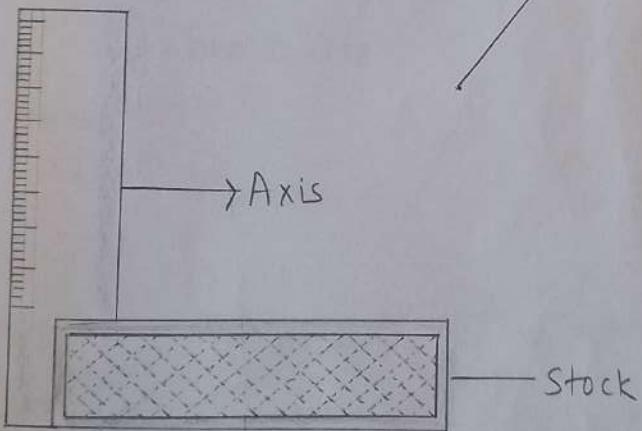


Fig:- Try Square

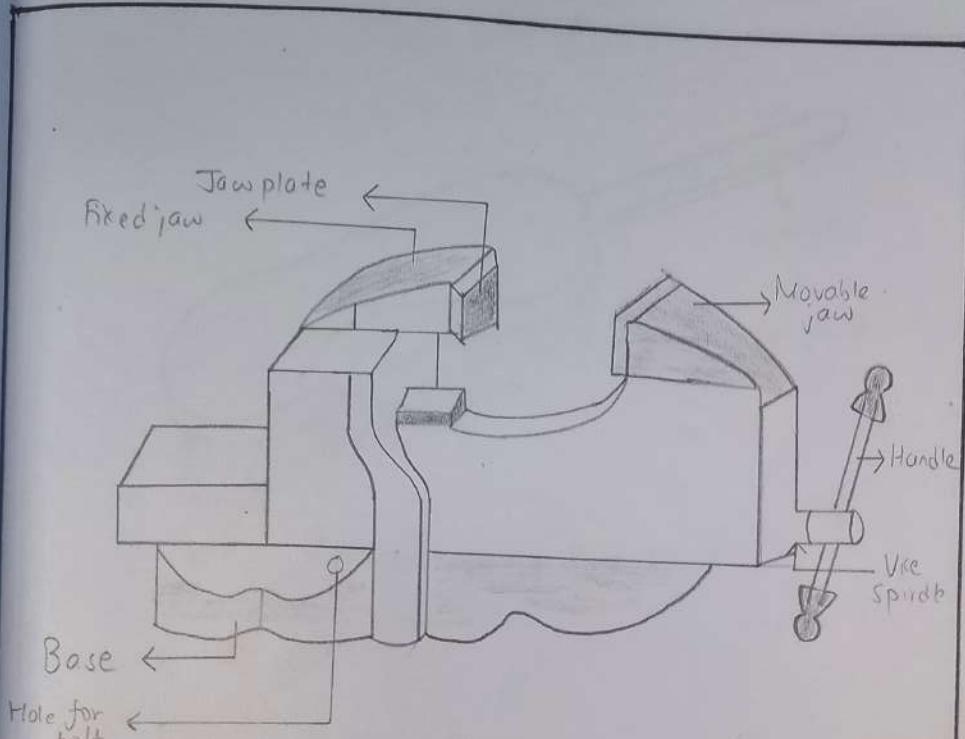


Fig: Bench Vice

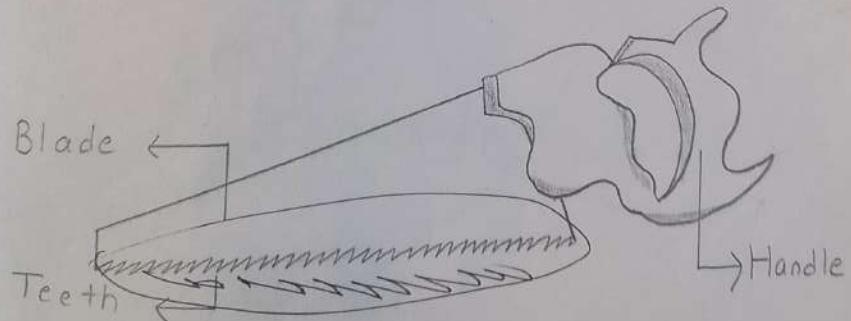


Fig: Rip Saw



Fig:- Cleaning Brush

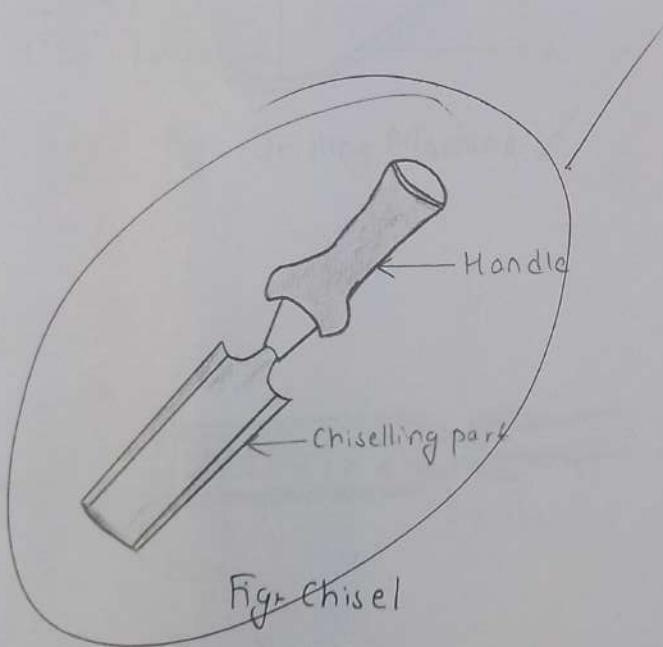


Fig:- chisel

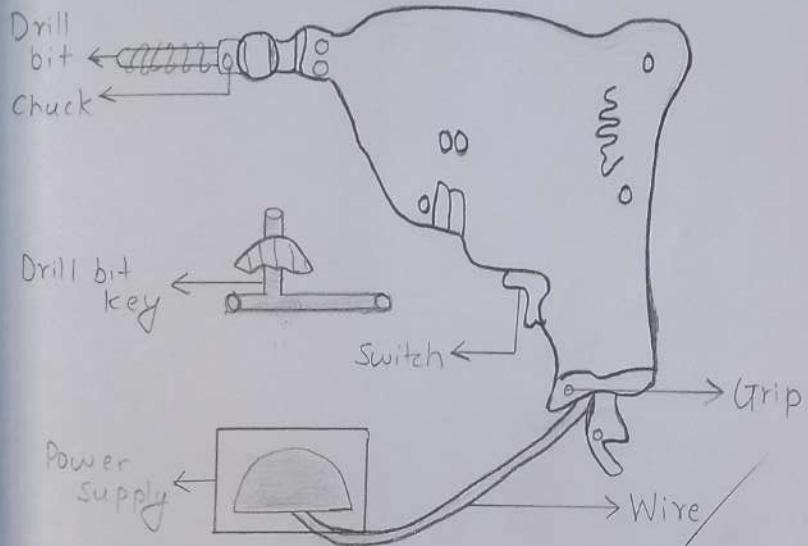


Fig: Drilling Machine

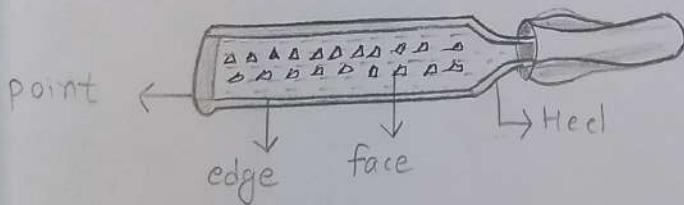


Fig: Rasp

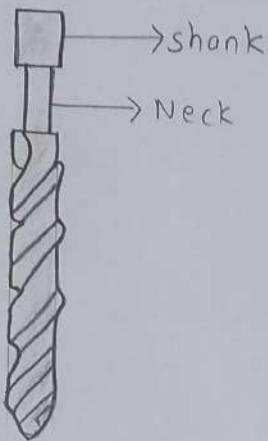


Fig: Twist Drill

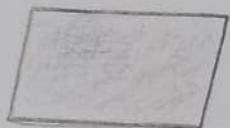


Fig: Sand Paper



Fig: Paint Brush

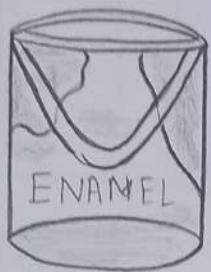
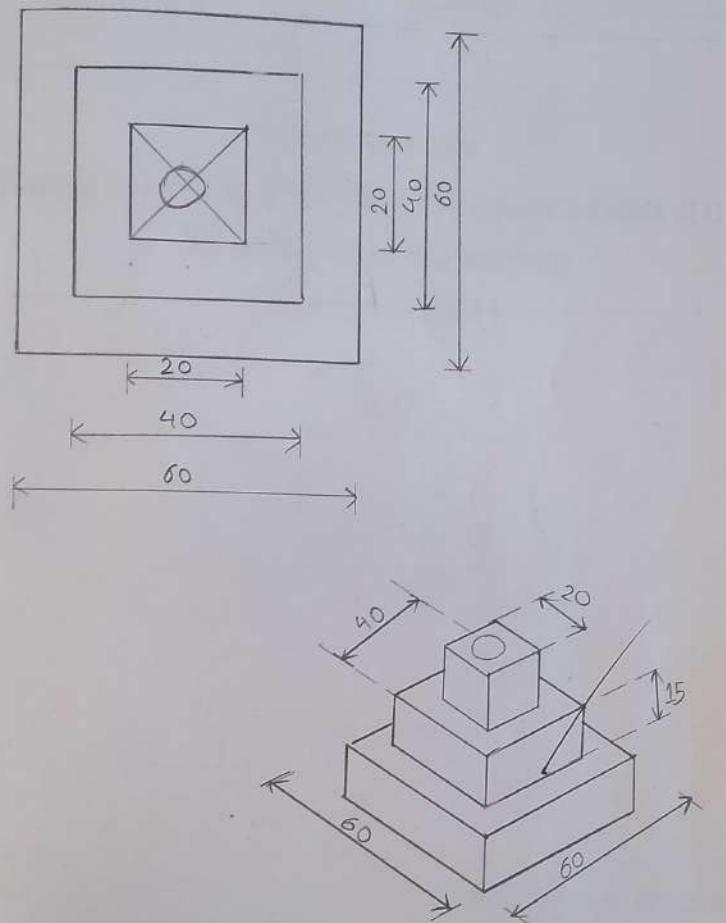


Fig:- Enamel



ALL DIMENSIONS ARE IN mm

| | |
|----------------------|-------|
| WORKSHOP-I | |
| KATHMANDU UNIVERSITY | |
| PRASHANTA | CIEG |
| ROLL NO: 64 | SCALE |
| | |

Report on Engineering Project Preparation and Workshop Practice (ENGG 101)



Sheet metal

Submitted to:

Name: Sheet metal operations

Roll No: and precaution

Group: by control report

Department: TT Chart

Date of Performance: 17th March, 2023.

Date of Submission: 13th April, 2023

Submitted to:

General Mechanical Workshop

Kathmandu University

School of Engineering

Department of Mechanical Engineering

Dhulikhel, Kavre.

SHEET METAL PRACTICE

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Introduction

The job related with the thin metal sheets like black iron, galvanized iron, copper, sheet, aluminium sheet are said to be metal sheets. It is generally considered to be a plane with thickness less than about 5 mm. It is generally working with the sheet metal from 60 gauge to 30 gauge with hand tools and simple machine to cut, form shape and join. The most common example of sheet metal works are cover pipes, hoods, funnels etc. These are light and less expensive.

For the sheet metal works, the knowledge of geometry is the most important as these are made by surface development. Sheet metal works is less time consuming and cheap because of it.

Some of the common types of metals are:

- a. Galvanized iron
- b. Aluminium
- c. Tin
- d. Copper
- e. Stainless stain

Objectives.

- To know about the different types of tools and machines used in metal works.
- To study layouts and surfaces
- To understand the mechanical terms used to perform work as in sheet metal works.
- To have knowledge regarding different kinds of patterns from development of surfaces.

Applications

Sheet metal work is very important in our daily life. The products obtained from metal are cheap and durable. For carrying out metal sheet work, the knowledge of geometry, measurement and properties of metal is very important because nearly all patterns come from the development of the surface of a geometrical model such as cylindrical prism, cone and pyramid.

TOOLS REQUIRED

1) Marking and measuring tools

a. Steel Scale

Steel Scale is a measuring tool to measure the dimension of an object in centimeters or in inch. It is made up of stainless steel, where the dimensions are engraved in it. Long steel scales are provided for dimensioning. It can be used to measure up to least count of 0.5 mm.

b. Scriber.

The scriber is used for dimensioning while the marking of dimension is done by scriber on the metal sheet by scratching the metal. It is the sharp pointed steel rod having 150 mm to 30 mm length and 3 to 5 mm in diameter. It is used instead of pencil or ink pens so it doesn't fade away easily and cutting can be done precisely.

c) Punch.

The punch is used in sheet metal works to punch the located centres in permanent way. Here, we locate the centres with one end pointed. There are two common types of punch.

- i) Centre punch
- ii) Prick punch.

2) Striking tools.

a. Mallet

A mallet is a kind of hammer often made up of rubber or sometimes wood. Rubber mallets are used when a softer blow is called for than that delivered by a metal hammer. They are used for sheet metals as they don't leave marks after beating.

b. Hammer

Hammers are used for forming the shapes by hollowing, raising, stretching or throwing off. It is used for fixing

c. Cross pin hammer

It is a hard tool made up of forged steel and used to strike the corner of the sheet.

3) Cutting Tools

a. Snips or shear

It is used for cutting thin sheets of metals along the straight line or the circular cuts. The appearance of the snip resembles with a pair of scissors. Straight hand shear is used for cutting straight lines and curved hands shear are used for making circular cuts.

4) Other tools.

a. Stakes

These are sheet metal workers anvil for bending, shearing and riveting sheet metal works.

b. Pliers

Pliers are used to hold and bend. In the sheet metal works, vice pliers are used to hold the materials while drilling and other operations.

c. Rivets.

Rivets are used to fit joints.

Machines Required.

a. Bar folder

It is a machine made up of iron. It consists of two metal arms in between where sheet metals are kept for folding and bending. The handle is moved which applies pressure on its arm and we pull upwards, the bend forms and the required shape is obtained.

b. Hand driving machine

It is an electrical machine used to make holes of the required dimension in a sheet metal. The plate to be drilled is marked with a centre punch and it is also used for many activities where we press switch to power on.

Operations

1) Shearing

Generally, cutting of the metal sheets in many ways is called shearing. This process is done by hand snips and shear.

2) Bending

Bending is the process by which metals are bent in desired shape. Bending occurs when the forces are applied to localized area beyond elastic limits. It is done by the bending machines.

Some types of bending are.

- a. Single bend
 - b. Double bend
 - c. Embossing
 - d. Enlarged section.
 - e. Beading
 - f. Straight flange
 - g. Curling.

3) Drawing

The drawing can be categorized in two types as - i) Deep drawing
ii) Shallow drawing.

4) Squeezing:

It is a quick and widely used way of forming ductile metal. The squeezing operations are ironing, sizing, coining, hobbing, riveting etc.

5) Punching:

Punching is the process of making cut work locating centres etc in a permanent way. Generally, there are two types of punch as mentioned below:

- i) Central punch
- ii) Prick punch

The prick punch is used to make small marks on the layout liner in order to make marks. The central punch is only used to make the prick punch mark larger at the centre of hole.

6) Folding

A folding is a process of bending and folding the edges of the metal sheets to form the joints. This is used for shaping the metal sheets.

7) Drilling

It is the process of joining the two pieces of sheets by using rivets. The pieces of joint should be drilled first. Generally, rivets are used in sheet metal works.

8) Rivetting:

It is the process of putting the aluminium rivets of 3.5 mm in the two holes. The rivet gun punches and cut the excess and it was hammered till it was flat.

Sequence Of Operations.

- First the given pieces of the sheet metals was cut from the large sheet of galvanized metal sheet.
- The sheet metal was marked at required dimension
- The unwanted areas were cut out with the help of snips.
- The sheets were folded in the required places with the help of folding machines
- The handle was also made in the same way.

- Then the pair and the handle were marked off for rivets holes with the help of prick punch and centre punch.
- The holes of both were aligned and rivets were placed.
- The rivet gan punched and cut the excess
- The rivets were hammered till they were flat.

Safety and Precautions.

- Sharp and pointed tool should be handled with care
- Apron and shoes should be worn during the work.
- Hammering should be done with care.
- Hand drill should be used under supervision of lab supervisor
- Instruction provided by the instructor should be followed carefully and should not be breached.

Quality Control Report

Quantitative (Before Operation)

| SN | Description | Req. measurement | obt. measurement | Deviation |
|----|------------------|---------------------|---------------------|-----------|
| 1 | Length of steel | 254 | 254 | 0 |
| 2. | Breadth of steel | 200 | 200 | 0 |

Qualitative.

| SN | Description | Remarks |
|----|------------------|---------|
| 1 | Finishing | Good |
| 2 | Perpendicularity | Good |
| 3 | Plainness | Good |
| 4. | Smoothness | Good |

Qualitative (After Operation)

| SN | Description | obt measurement | out of | Deviation |
|----|---------------------|--------------------|-----------|-----------|
| 1 | Length of dust pan | 201 | 200 | +1 |
| 2 | Breadth of dust pan | 120 | 120 | 0 |
| 3 | Height of dust pan | 39 | 40 | -1 |
| 4 | Length of handle | 82 | 80 | +2 |
| 5 | Breadth of handle | 30 | 30 | 0 |
| 6. | Height of handle | 29 | 30 | -1 |

Comments :-

Even due to lack of work experience, the work done was acceptable. The sheet metal work looked good when it was kept on table and was precisely made following every instructions.

GRANTT Chart

| SN | Work Parameter | Day 1 |
|----|----------------|-------|
| 1 | Marking | |
| 2 | Cutting | |
| 3 | Folding | |
| 4 | Drilling | |
| 5 | Riveting | |

Cost Estimation.

1. Cost of galvanized iron sheet of 4×8 sq ft
= Rs 2100

$$[4 \times 12 \times 25.4] \times [8 \times 12 \times 25.4] \leftrightarrow \text{Rs } 2100$$

$$\text{on } 1 \text{ sq mm} = \frac{2100}{2972892.28}$$

on GI metal sheet of required dimension
= Rs 36

2. Cost of Aluminium Rivet of 3.5 mm
= Rs 5/- per piece

3. Cost of Electricity consumption
1 unit \rightarrow Rs 10

In drilling practice,
0.25 unit \rightarrow Rs 2.5/-

4. Labour Cost

$$1 \text{ hour} = \text{Rs } 75$$

In metal sheet practise = 3 hrs
 $= 75 \times 3$
 $= \text{Rs } 225/-$

So,

$$\begin{aligned} \text{Total cost} &= \text{Rs } (36 + 5 + 2.5 + 225) \\ &= \text{Rs } 268.5 \end{aligned}$$

So, the metal sheets work cost total of
Rs 268.5. (Two hundred sixty eight
and fifty paisa).

Conclusion

Hence the sheet metal work was finished in time with good finishing. The overview of tools and machines along with process in practise can be used for further practice in future and can be applied in required time.

FIGURES



Fig: Measuring Scale

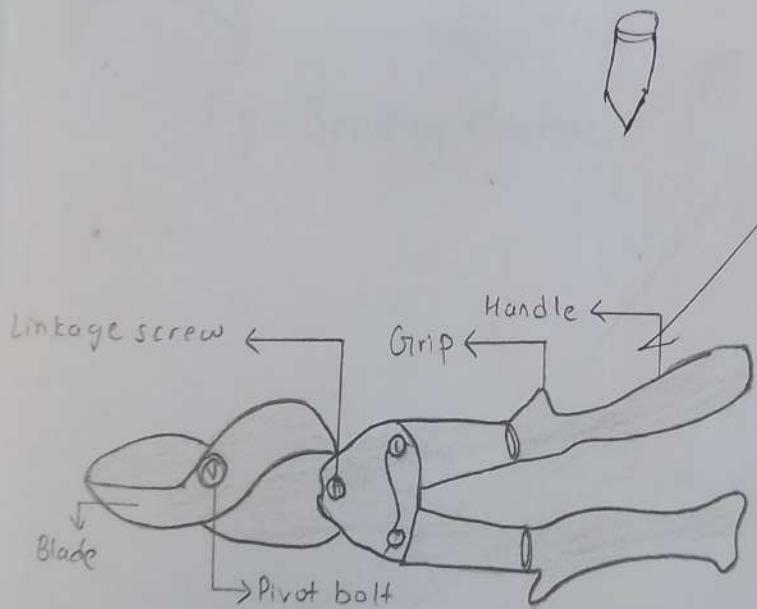


Fig: Shear

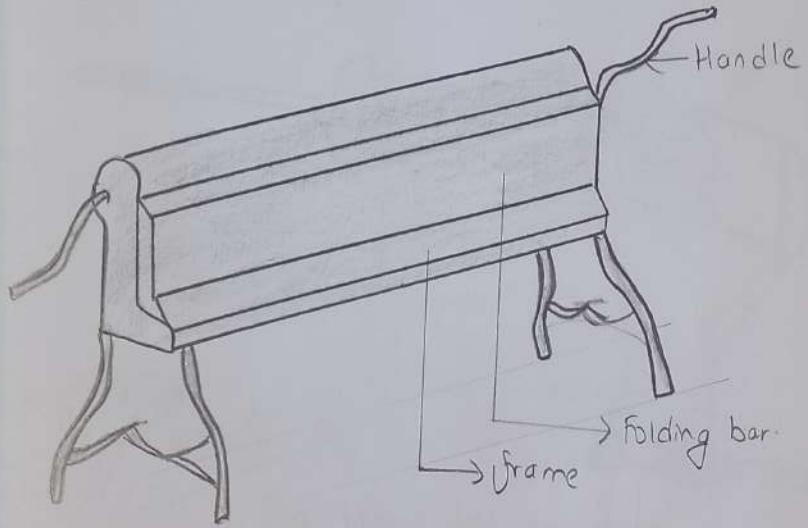


Fig : Bending Machine

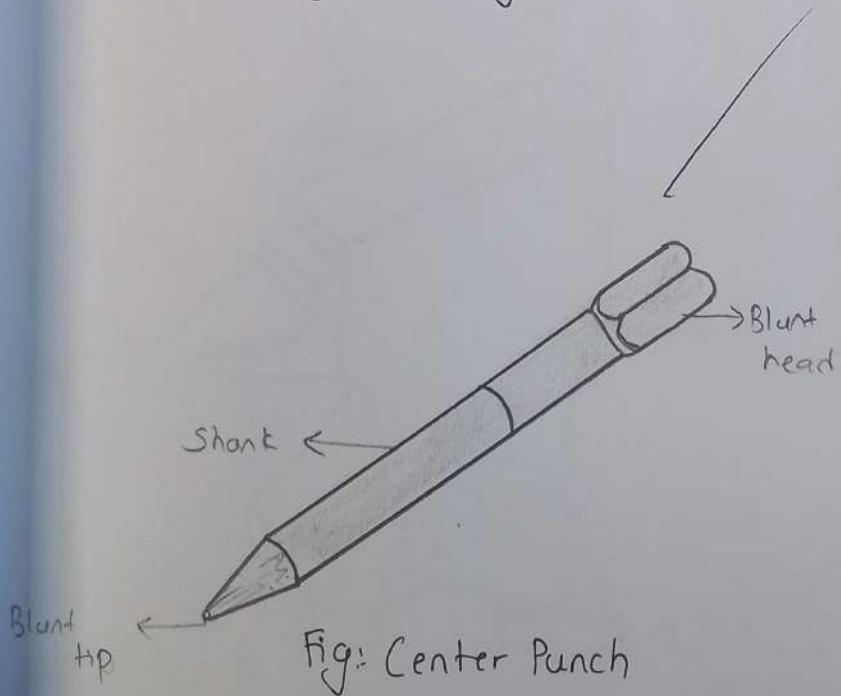


Fig: Center Punch

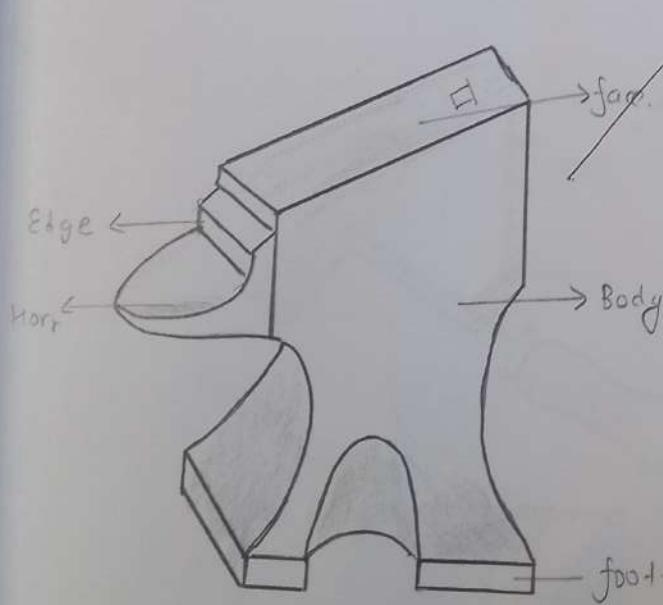
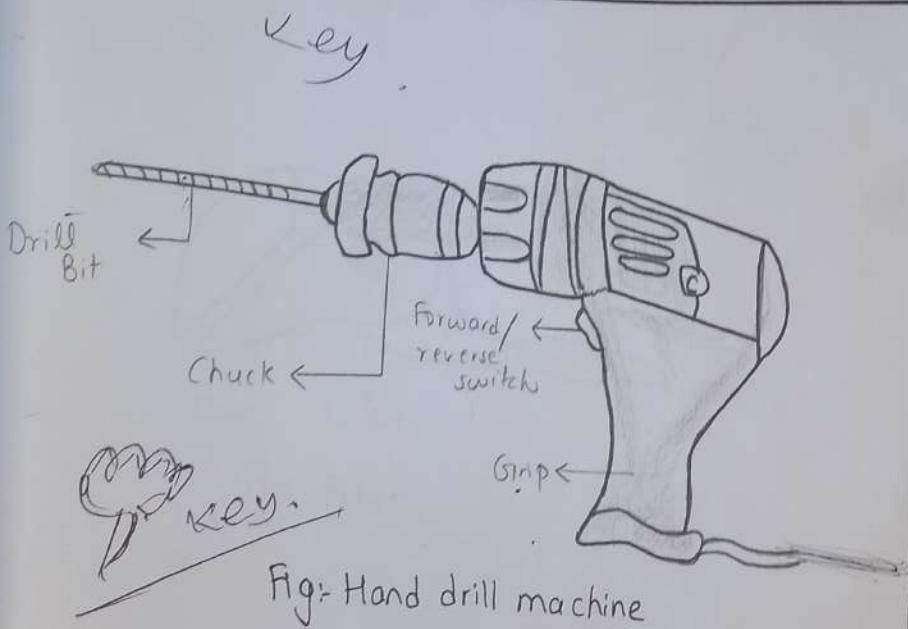


Fig: Anvil

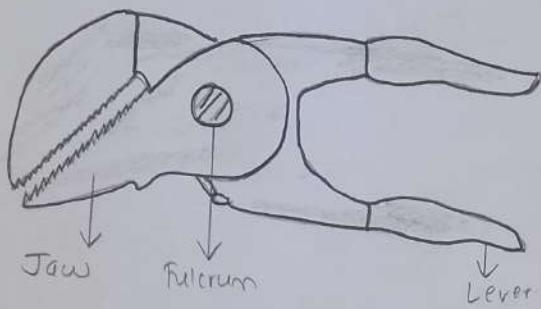


Fig: Plier

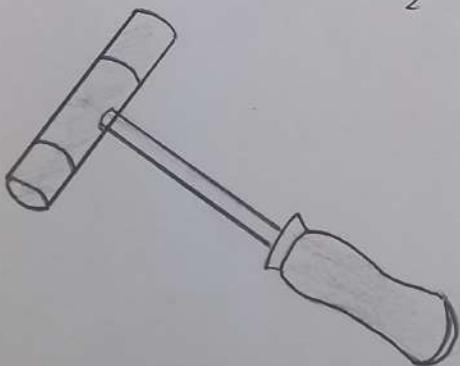


Fig: Mallet Hammer

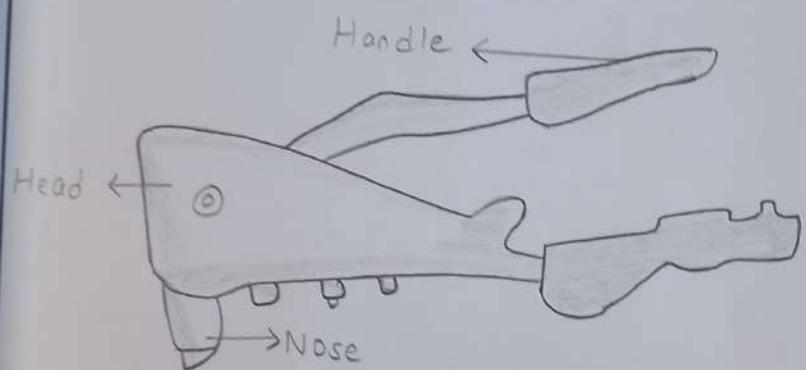


Fig: Rivet gun

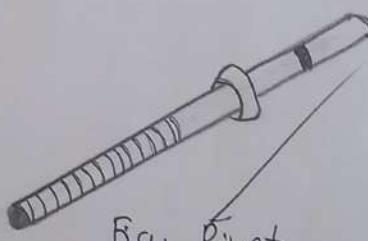
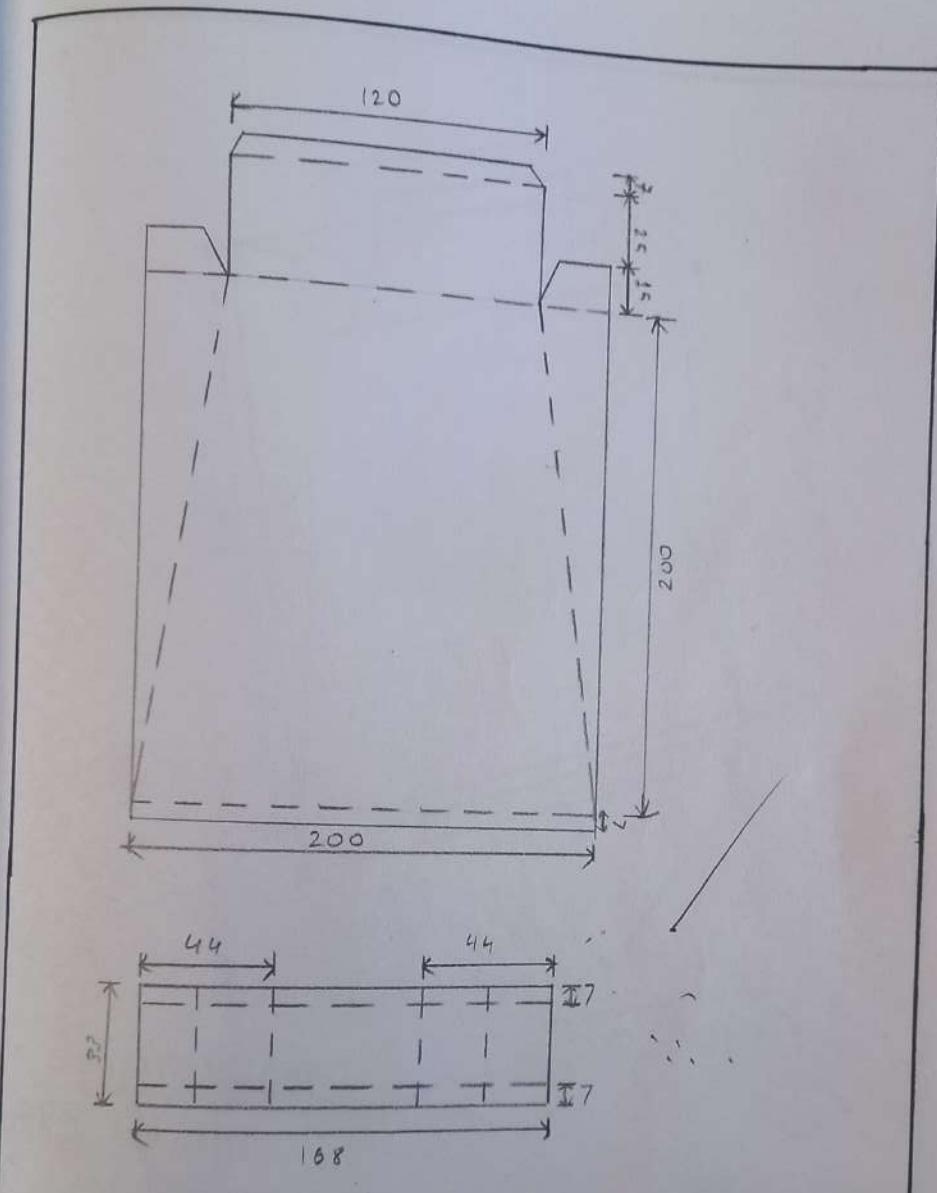
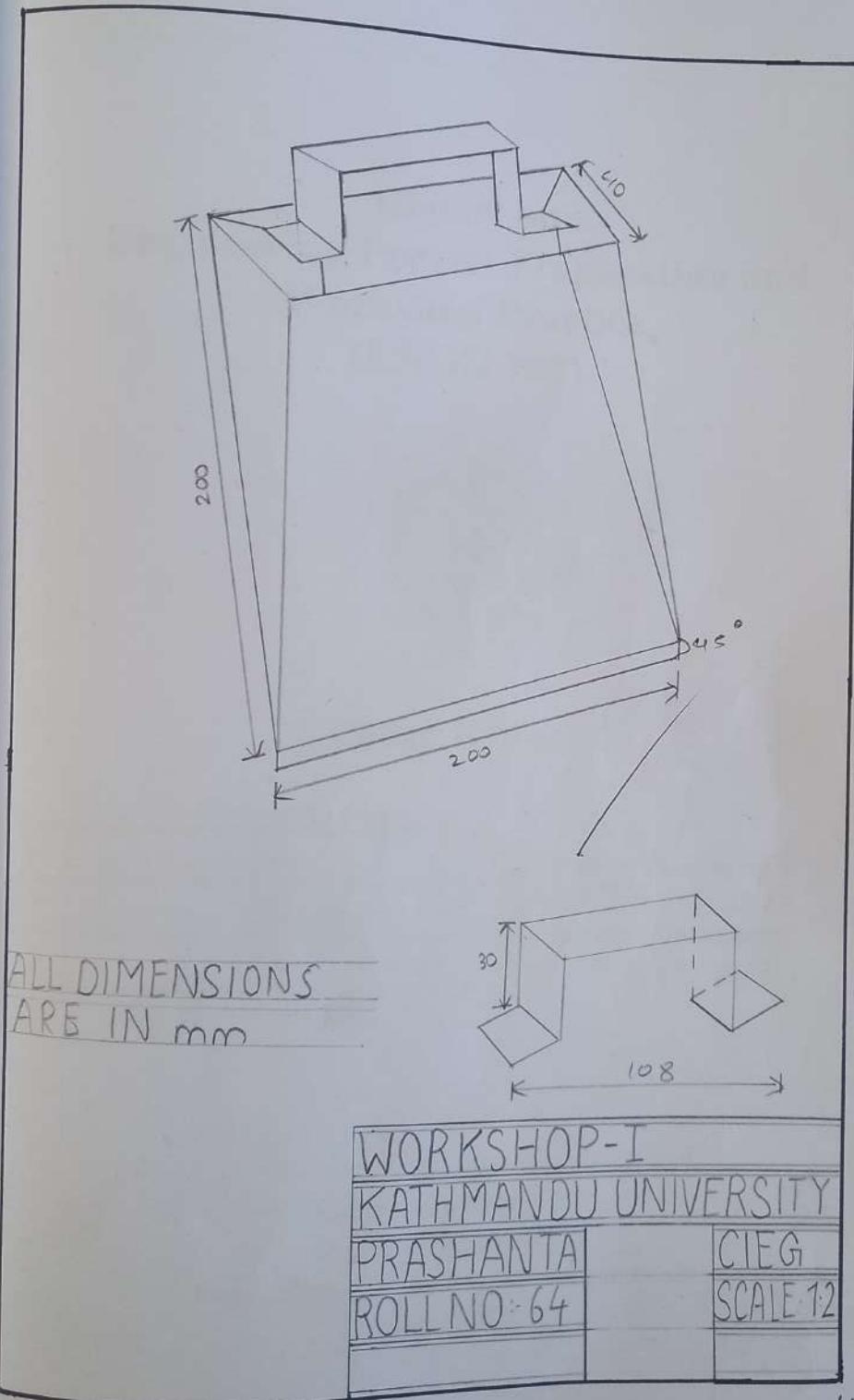


Fig: Stake



| | |
|----------------------|-----------|
| WORKSHOP-I | |
| KATHMANDU UNIVERSITY | |
| PRASHANTA | CIEG |
| ROLL NO-64 | SCALE 1:2 |



**Report on
Engineering Project Preparation and
Workshop Practice
(ENGG 101)**



Fitting/ KU Logo

| Fitting QJ | |
|------------|------------------------|
| 6 | Tools Required |
| 7. | Operations Involved |
| 8. | Sequence of Operations |

Date of Performance:
24th March, 2023.
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BENCHWORK AND FITTING

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Introduction

Bench work is the work done primarily at bench with hand tools which is occasionally supplemented by small power driven tools.

A bench fitting is a mechanical job work done using a bench vice to hold the job and the operation with normal manual tools.

Various operations are performed in fitting practice are Sawing, drilling, chipping, Marking, striking, Grinding, Polishing, Drilling, Reaming, Tapping, Scrapping, Dieing and welding.

Objectives

1. To gain basic knowledge about the different tools used in fitting.
2. To develop the skills in handling operation tools like file, saw, hammer etc.
3. To have knowledge about the different operation such as chipping, drilling, marking, tapping, sawing, filing etc.
4. To be self-dependent on minor fitting works.

5. To know different types of metals.
6. To know the concept of metal work.

Applications.

1. In making many things such as paper weights, souvenirs etc, the fitting process can be applied.
2. In making things that were impossible to make before.
3. Repairing minor operation and preparing complex geometry.

Introduction To KU Logo

A logo of KU is developed by using different tools and working on mild steel. The metal used to make a KU logo is mild steel. KU Logo has a height of 50 mm and width of 55 mm enriched in a triangular rod encircled with circular rod 25mm long.

Application of KU Logo

1. It can be used for decoration.
2. It can be used as a gift.
3. It can be used as a paper holder.

Tools Required

1) Marking Tools.

a. Steel Ruler.

It is used to draw line and take measurements. This is usually marked in both inches and centimeters. It is one of the most important tools as it is used for measurement purpose and precise measurement is necessary to make KU logo perfect.

b. Punch.

Punch is used in fitting shop is centre punch, which is used for marking out loads, locating centres and other marking purposes.

c) Scribler

It is a piece of hardened steel about 150 to 300 mm long and 3 to 5 mm in diameter pointed both end or one end like a needle. It is held like a pencil and is used to scribe lines on metal pieces. The bent edge is used for scratching lines in place where straight line end cannot reach.

d) Try Square

It is used to get another edge or surface exactly at right angles to an already true edge or surface and for laying out work also.

2) Files.

Files are the metal surface containing alternative lines of the sharp edges on which we used to rub our job pieces in order to make our rough surface into smooth surface. It is one of the most essential materials as it gives the proper shape to our job piece after we finished the cutting. There are different types of files:-

- a. Single cut
- b. Double cut
- c. Rasp cut
- d. Square
- e. Triangular.

- f. Semi-circular
- g. Circular

i) Flat file:

It has a double cut on the faces and single cut on edges. It is tapering in width and thickness.

ii) Triangular file:

It is tapered, has double cut and is shaped of an equilateral triangle. They are used for triangular cuts and filing cuts less than 90°.

iii) Half-round file:

It is also tapering, has double cut and is not exactly half circle but one third of a circle. It is used for round cuts and filing curved surfaces.

iv) Square file:

This type of file is used in smoothening flat surfaces and also at the corners.

v) Round file

These files are round in shape/cross-section and usually tapered. These are usually used in filing curved surfaces. They may have single or double cut.

3) Cutting tools.

a. Chisel

It is used for cutting and chipping the job piece. It has a rod made up of high carbon steel whose one end is made up of sharp and pointed and another end is flat since it has a striking head. The cutting edge given in chisel is determined by the nature of metals to be chipped.

b. Hacksaw

A hacksaw is fine toothed saw originally made for cutting metal. They are mostly hand saws with a L-shaped frame that holds a blade under tension. The blade is disposable. A screw mechanism is used to put blade in tension. Hacksaw blades should be set to be facing forward.

4) Striking tools.

a. Hammer

Hammer is used for striking a job or tool and it is made up of forged steel. A hammer consists of four parts namely; pin, head, eye and face. Hammer used n fitting is of 0.4 kg. It is categorized by shape, weight and specific performance. It is made by hardened and tempered steel. Some of the common hammers used are as follows:

- i) Cross pein hammer
- ii) Ball pein hammer.

5) Punching Tools.

a. Centre punch

It is a rod shaped tool containing octagonal or hexagonal surface and one end is flat as a striking head and other end is pointed.

6) Bending Tool

a. Fixer

The frame where material is bent is fixer. It is clamped by bench vice.

7) Threadening Tools

a. Die

The Die cuts a thread on a performed cylindrical rod which creates a male threaded piece which functions like a bolt. The die we used was external thread die.

8) Holding Device

a. Bench Vice

The bench vice is the holding tool used for holding the metal sheet. It consists of an iron body, a fixed jaw and a movable jaw made up of cast iron and a threaded screw made of mild iron. The movable jaw is moved by handle of screw. The holding face of jaws are provided with the teeth holding workspace. The size of vice is known by width of teeth or jaws. that ranges from 80 to 40 mm.

b. C-clamp

The C-clamp is a C-shaped clamp consisting of C shaped armature and a moveable tightening handle provided with threads. It is used to fix the fixer in position during

bending of a rod.

9) Welding Machines.

Welding tool contains an alloy rod and a clamp which holds the alloy rods while welding.

Welding is a process of joining two similar or dissimilar metals by fusion without application of pressure. The fusion takes place by heat produced from electric resistance.

10) Painting

The process of coating the job pieces with paint so that external agents like moisture, crumbling could not affect the job pieces is called painting. The materials used are:

a. Paint brush

It is simple kind of brush having bundle of fibres attached to handle. The fibre is arranged in a rectangular bundle.

b. Paint

It is mixture of different compounds which have adhesive and cohesive force and helps to protect the object from external agent and also makes object attractive.

Operations Involved

1) Marking and measuring

The process of taking measurement and marking is primary process. Marking in a metal can be done by scriber by measuring before it using scale and trisquare.

2) Cutting

Cutting can be done by using hacksaw over the guidelines marked before chiseling. It is also a process of cutting. It is done by chisel struck over by hammer.

3) Filing

Filing is one of the finishing process. It involves smoothening of the metal edges cut roughly through by hacksaw. Tools for filing are flat file, square file, triangular file, etc. According to the cuts, it can be classified as :-

- a) Single cut
- b) Double cut
- c) Rasp cut

4) Striking

The process of using physical force to beat is striking. It can be done by hammers along with cutting instruments like chisel, punches etc.

5) Punching

Making an impression on workpiece by using punches along with striking tool is punching. Several types of punches are used in the process like central punch, prick punch etc. They are marking tools.

6) Bending

The process of making curves by using clamps, fixer and templates is called bending.

7) Threading

A fixture prepared by making helical grooves on a cylindrical object is threading. We use die and taps for threading (for making threads). Threads on bolts are made by external die but threads on nuts are made by taps.

8) Painting.

The KU logo is then painted using brush and enamel paint. We applied silver paint on the KU logo and dried it and again applied the second layer.

Sequence Of Operation.

1. First the metal plate is marked by the help of marking and measuring tools.
2. Cut is made with the help of hacksaw and chisel
3. After that, filing is proceeded for making the surface and the edges smooth.
4. Then, the rod of 26.5 cm length was marked, cut and bent over the filter.
5. After bending the straight portion, it was threaded with the help of external thread die.
6. The K.U logo is then fitted to the triangular shaped rod using the welding process.
7. The logo was painted with silver enamel.

Safety Measures

- The cutting and striking tools should be handled with care.
- One should use the instruction provided by instructor
- Apron and gloves should be worn.
- Machines should be turned off after use
- The machine and tools which we don't have enough knowledge should be handled with supervisions.

Quality Control Report.

Qualitative (Before Operation)

| SN | Description | Required size | Obtained size | Remarks |
|----|------------------|---------------|---------------|---------|
| 1. | Length of metal | 55 | 55 | Good |
| 2. | Breadth of metal | 50 | 49 | Good |
| 3. | Length of rod | 26.5 | 26 | Good |

Qualitative.

| SN | Description | Rating |
|----|---------------------|--------|
| 1 | Assembling | Good |
| 2 | Smoothness | Good |
| 3 | Curve and finishing | Good |

Qualitative (After Operation)

| SN | Description | Req. size | Obt. size | Deviation |
|----|--------------------|--------------|--------------|-----------|
| 1. | Length of K.U Logo | 55 | 54 | -1 |
| 2. | Breadth of KU Logo | 49 | 48 | -1 |
| 3. | Width of letters | 10 | 9 | -1 |
| 4. | Length of rod | 26.5 | 26.4 | -0.1 |
| 5. | Length of threads | 15 | 16 | +1 |

GANTT Chart.

12 hr
4 day.

| SN | Operation | DAY | | | ④ |
|----|--------------|-----|---|---|---|
| | | 1 | 2 | 3 | |
| 1 | Cutting | | | | |
| 2 | Chiselling | | | | |
| 3 | Riling | | | | |
| 4 | Curve Making | | | | |
| 5 | Welding | | | | |
| 6 | Painting | | | | |

Cost Estimation

1. Cost of 1 kg mild-steel plate - $5 \times 50 \times 55 \text{ mm}$

1000 gm \rightarrow Rs 90/-
per kg

$$100 \text{ gm} \rightarrow \frac{\text{Rs } 90}{1000} \times 100 \\ = \text{Rs } 9/-$$

2. Cost of 1 kg TMT bar 7mm diameter
= Rs 85 per kg

$$1000 \text{ gm} \rightarrow \text{Rs } 85 \\ 100 \text{ gm} \rightarrow \frac{\text{Rs } 85}{1000} \times 100 \\ = \text{Rs } 8.5/-$$

3. Cost of 1L of enamel paint = Rs 320/-
per litre.

$$1000 \text{ ml} \rightarrow \text{Rs } 320$$

$$50 \text{ ml} \rightarrow \frac{\text{Rs } 320}{1000} \times 50 \\ = \text{Rs } 16/-$$

4. Electricity consumption

$$1 \text{ unit} \rightarrow \text{Rs } 10$$

For welding practice, 0.5 unit

$$0.5 \text{ unit} \rightarrow \text{Rs } 10 \times 0.5 \\ = \text{Rs } 5/-$$

5. Labour cost

1 hours \rightarrow Rs 75

Fitting involves 6 hours = $Rs\ 75 \times 6$
So, = Rs 450

Total cost = $Rs\ (9 + 8.5 + 16 + 450 + 5)$
= Rs 488.5/-

\therefore The total cost of fitting practice is
Rs 488.5/- (Four hundred eighty eight
rupees and fifty paise only)

Conclusion.

The job was completed with good
finishing. Desired shape and size of KU
Logo was made. After the completion
of job, overview of tools and machines
was done for further use.

FIGURES

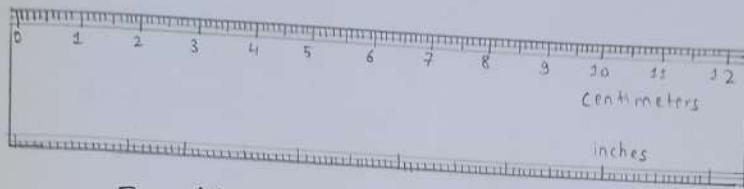


Fig: Measuring Scale

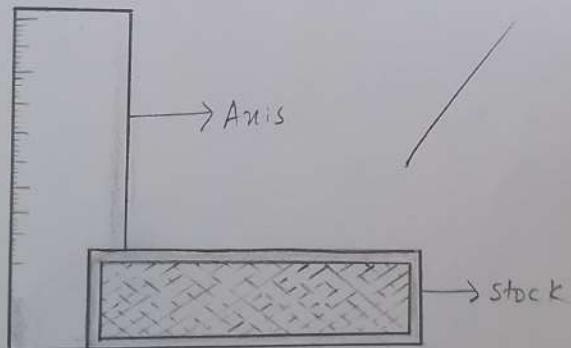


Fig: Try Square

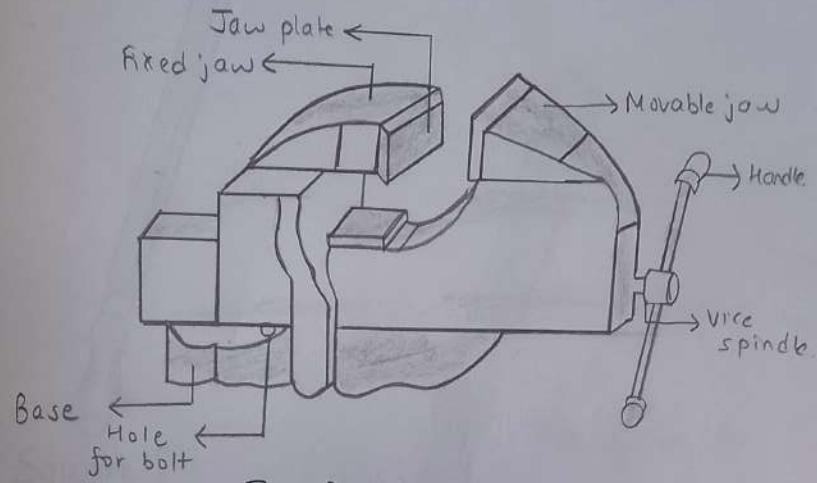


Fig: Bench Vice

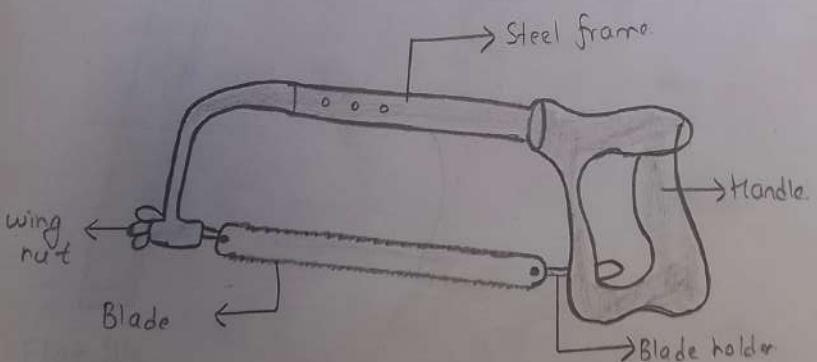
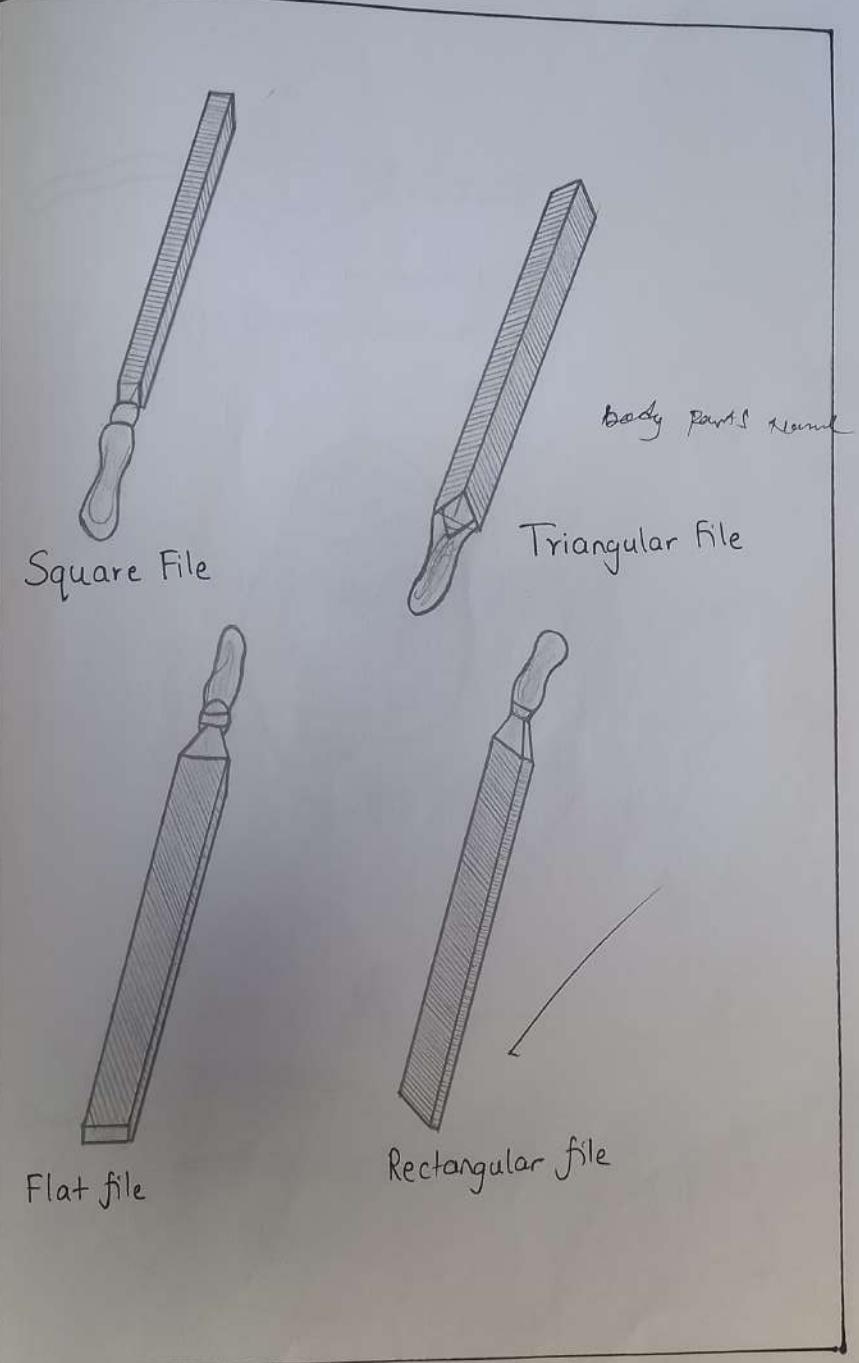


Fig: Hack Saw



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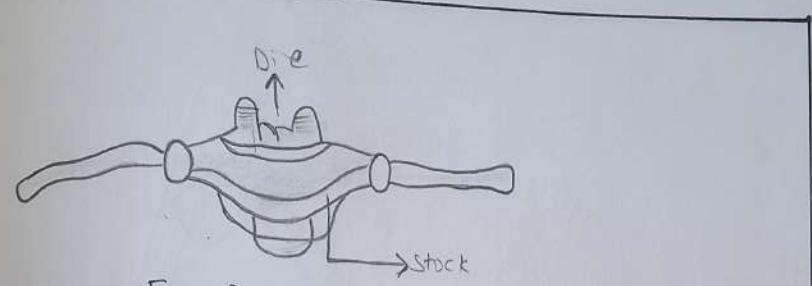


Fig:- Dieing machine



Fig:- Die



chisel

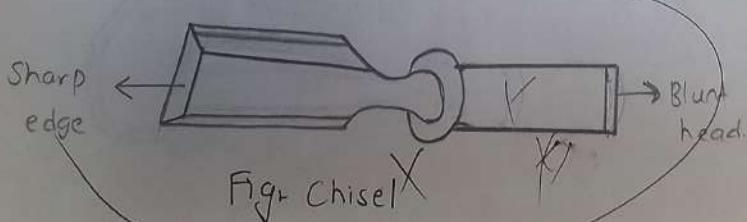




Fig = Sledge
hammer

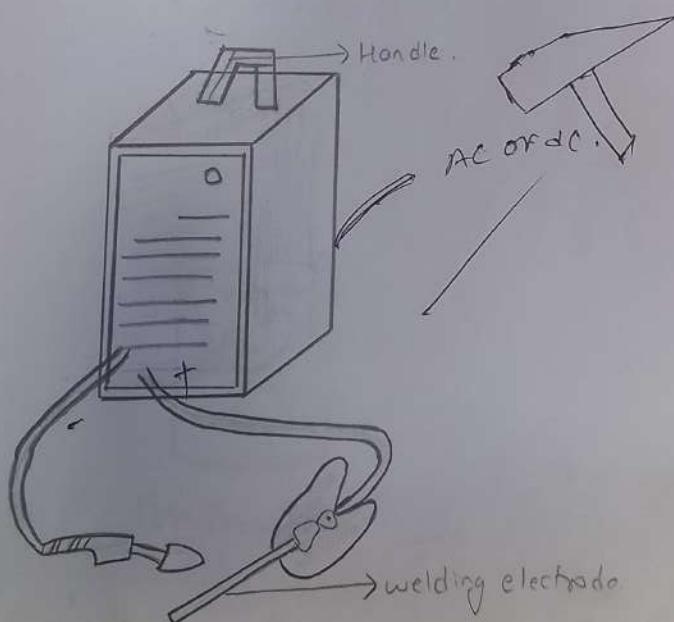


Fig = Welding Machine

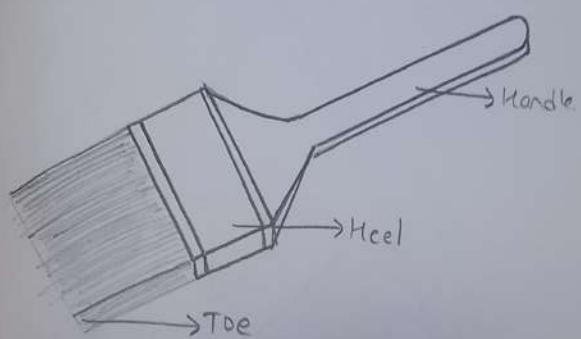
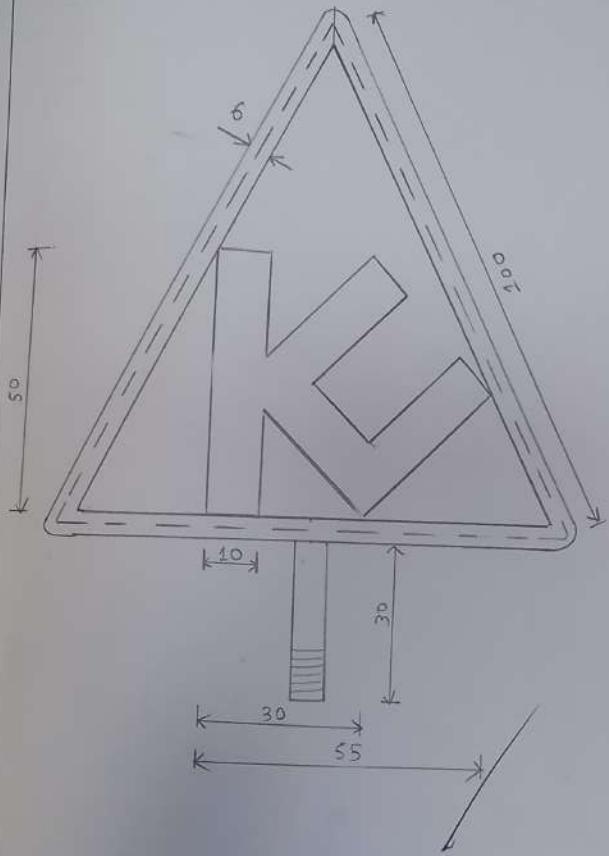


Fig:- Paint Brush



Fig:- Enamel



ALL DIMENSIONS ARE IN mm

| | |
|----------------------|-----------|
| WORKSHOP-I | |
| KATHMANDU UNIVERSITY | |
| PRASHANTA | CIEG |
| ROLL NO. 64 | SCALE 1:1 |
| | |