Subject:- Basic Technology

Topic:- Metal work and tools for marking out and measuring tools

Definition

Metalwork is the art and skill of creating useful objects out of metal. To do metalwork properly, you need the correct tools. In a metal workshop,

There are two types of tools namely, hand tools and machine tools.

Hand tools are tools held manually for operation in metal work. They include the following: The teacher identify metal marking out tools

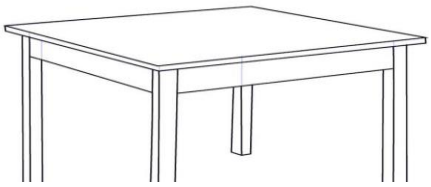
1. Marking-out tools.
2. Cutting tools
3. Driving tools
4. Measuring tools,

Sub-topic:- Marking-Out Tools In metalwork

Marking-out tools are used to check alignment on surfaces or indicating points or positions, They include tools like surface plate, surface table, scribers, odd-leg calipers, dividers, punches and the try-square.

(i). Surface plate: The surface plate is a tool made of cast iron used for checking the flatness of metal sheets and other flat objects.

(ii). Surface table: The surface table is a bigger version of the surface plate. It is used for ascertaining the flatness of large objectsand checking accuracy.



(iii). Scribers: Scribers are used to mark-out straight lines in conjunction with steel rule on edges. It is made high carbon steel,

(iv). Odd-leg Calipers: The odd-leg caliper is for locating the center of bars and drawing parallel lines to a given edge.

(v). Dividers: In metalwork, dividers are used for scribing arcs, circles, curves and for setting-off distances.

(vi). Punches: There are two types of punches used in metal work, a. The centre punch, used for locating the centre of a hole to be drilled.

b. The dot or pick punch is used to make small marks on scribed lines so as to make the lines more visible when the work is being handled,

(vii). Try-square: The try-square is used for testing the sureness of a surface at 90°.

Sub-topic:- Metal Work Measuring Tools

Metal work measuring tools it is a common measuring tools used in metalwork include steel rule, calipers, combination sets, micrometers and vernier calipers.

(i). Metric rule: This tools is used for taking straight line measurement. It is made of steel. The engineer's measuring tape can also be used for this purpose,

(ii). Calipers: The calipers are used for measuring diameters. The inside caliper for inside diameter and the outside caliper for outside diameter of holes.

(iii), Combination set: This is a set that consists of a centre square, a square head, a protractor and a graduated steel rule called the blade. This set can be used as a trysquare, protractor, centre gauge and a depth gauge.

(iv). Micrometer Screw Gauge: This tool is used for measuring the outside diameters of thin wires.

(v). Vernier Calipers: The vernier caliper can do the jobs of the inside and the outside calipers to a very accurate measurement.

(vii). Depth gauge: This tool is used to measure the depth of holes, recesses and slots of deep objects.

Objective questions

1. Define metal work hand tools
2. Identify at least four marking-out tools and state their uses
3. Identify at least five measuring tools and state their uses?

Week 6

DRIVING TOOLS:- These are tools used for pushing in nails, screws into position. Examples are:

HAMMERS: have two distinct parts, the handle and the head. While the handle can be made of wood or metallic material, the head is always made of high carbon steel. The hammer is classified according to the type of head, hence we have: Ball peen, straight peen, cross peen and planishing hammer, Ball

MALLETS: this is a soft hammer whose head is made of soft material like synthetic rubber to prevent the head from damaging the surface of the work piece.

PUNCHES: These are used for producing holes on thin sheets of metal, to mark holes for drilling and to remove rivet. Examples are: centre or dot punch, and pin punch for marking drill points. SCREW DRIVERS: These are used for driving screw into or out of structural members. Examples are flat screw drivers, star screw drivers, allen key, off-set screwdriver.

SUB-TOPIC:

CUTTING TOOL These are tools used for cutting piece of metals in the workshop. Examples: chisels, files scrapers and saws.

CHISELS: are chipping tools for shaping metals, where finishing by other means, such as filing, cannot be carried out. The common ones are; flat chisel, cross-cut chisel, round nose chisel, diamond

Files: are used for shaping metals. Examples are flat file, square file half round file, round files. Flat file Hand file Round file Half-Round File Triangular File Knife-edge File

SCRAPER: these look like file but they don't have teeth, They are used for removing slight irregularities from flat surface.

Saws: hacksaws are used for cutting metals. The blade may be adjusted by the user so as to cut in the sideways direction, Piercing saw is ideal for cutting curves; brass back saw is useful when working on soft metal.

Ways of maintaining cutting tools

1. Keep your tools in a dry place.
2. Store tools in their original cases.
3. Use rust collector or silica gel pack.
4. Clean your tools properly.
5. Inspect tools frequently for wear and damages.
6. Maintain the batteries of tools.

Topic:- BOARD PRACTICE

Definition

Board practice is the act of learning how to use drawing instrument on drawing board to draw vertical, horizontal, incline lines etc., in order to display good board practice, it is necessary to use the appropriate drawing instruments which includes the following:

1. Drawing board
2. Tee-square
3. Set-square
4. Pair of compasses
5. Divider
6. Protractor
7. HB, 2H pencil
8. Eraser

SETTING UP THE BOARD

Step 1 Place the drawing board conveniently on the table with the square edge to the left-hand side.

Step 2 Place the drawing paper on the board, leaving equal space all round.

Step 3 Place the tee-square on the paper, and gently slide or move the tee-square to the top edge of the paper.

Step 4 Set the top edge of the paper parallel to the edge of the tee-square, with the stock of the tee- square firmly against the edge of the drawing board on the left-hand side.

Step 5. Gently slide the tee-square down without moving the paper.

Step 6 Cut of pieces of adhesives tape to hold the paper in position, and place them over the four corners of the paper.

EVALUATION

Define board practice.

Mention the steps involved in setting up the board,

DRAWING OF LINES

All horizontal lines are drawn with the aid of tee-square, usually from left to right, and rotating the pencil as the line is drawn. This ensures uniform thickness of the line,

The set-square is used sitting on the tee-square to draw upright or vertical lines on the paper. Angled lines are also drawn with the set-square turned in different directions.

POSITIONING OF TITLE BLOCK

Title block is at the bottom right-hand corner of the drawing which consist of the following. Information (a) Title of Drawing (b) Name of object (c) School (d) Scale (e) Date

The title block should be lettered free-hand in single stroke capitals. The two types of lettering are vertical and inclined. Only one method of lettering should be used.

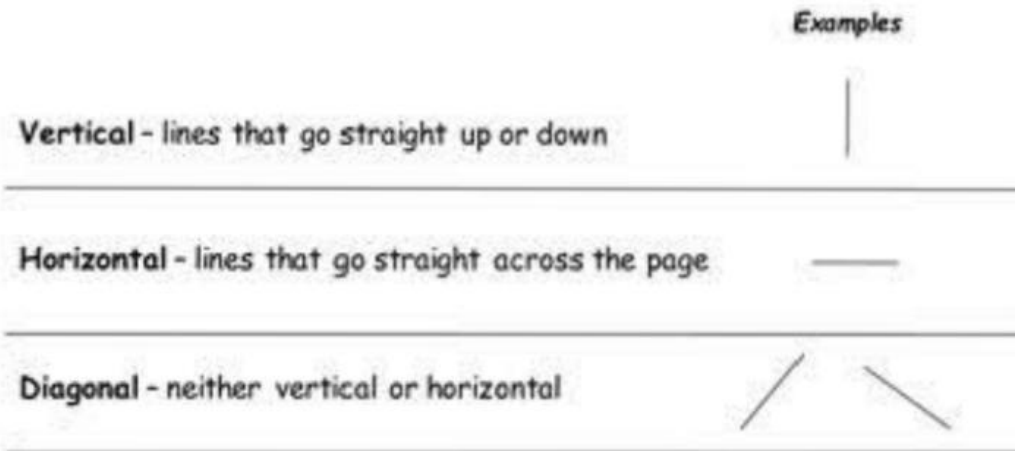
Sub-topic:-

Sharpening of Drawing Pencils to conical point and knife edge A well sharpened pencil is very essential to technical drawing. Pencils for lettering and freehand sketching should be sharpened to a 'conical point' while those for geometrical or engineering drawing should be sharpened to a 'chisel point'.

Using Tee and set square for drawing boarder

All horizontal lines are drawn with the aid of tee-square. The set-square is used sitting squarely on the tee-square to draw vertical lines.

Drawing horizontal and vertical lines



Topic:-Basic Freehand Technique

Free hand sketching is the use of pencil, eraser and just your hand to make a quick drawing of an object on paper.

Techniques used in Sketching Free Hand Sketching

(i). Straight lines; a straight line is defined as the shortest distance between two points.

To sketch a straight line using free-hand sketch, you put two dots at the ends of where the line will pass through. Then move the pencil across to the point to the right, starting from the left,

(ii). Curves: There are two techniques used when drawing curves using free-hand sketch.

(a). Use several dots to indicate the path of the supposed curve;

(i). Straight lines; a straight line is defined as the shortest distance between two points.

To sketch a straight line using free-hand sketch, you put two dots at the ends of where the line will pass through. Then move the pencil across to the point to the right, starting from the left.

(ii). Curves: There are two techniques used when drawing curves using free-hand sketch.

(a). Use several dots to indicate the path of the supposed curve;

(b). Gradually join these dots to form the required curve.

(iii).Circles: In sketching a circle using free-hand sketch, the following three steps may be useful.

(a), sketch a square box.

(b), sketch centre lines to divide the square into four quadrant;

(c), finally join each quadrant as demonstrated,

Free-Hand Sketching Instruments,

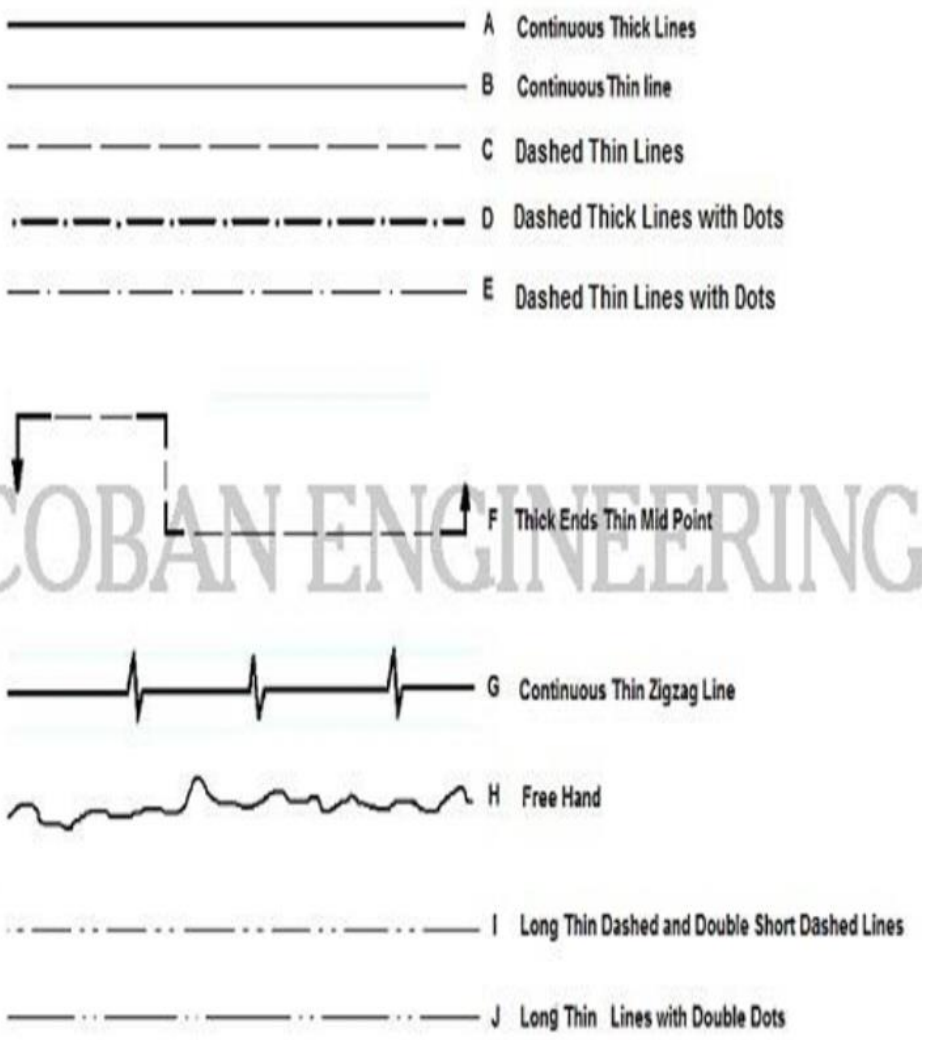
Following instruments are needed for the drawing of free hand sketching.

1. Soft Lead Pencil,
2. Eraser,
3. Sharpener.
4. Drawing Sheet.

Types and uses of lines in technical drawing

Technical drawing Lines are used for different purposes to provide specific information for designers, manufacturers, etc.

looking at the drawing. The person who will read drawings have to learn what they mean. Line types are also a language type to communicate between technical people.



Free hand sketching

A; Continuous Thick Line: Surroundings

Sides of the matters (Outlines of the Edges), End of the Screws,

B. Continuous Thin line: Measure lines, Backside section lines, Implied axis lines, to state the code of the planes, at diagonal lines which are used to state plane surface, intersection, Leader, Hatching.

C; Dashed Thick Lines with Dots: To state the special places/surfaces which will processed additionally like to coat, to harden etc.

E; Dashed Thin Lines with Dots: Axis lines of symmetrical drawings, In front of section planes.

F; Chain Thin with Thick Ends: Cutting Plane, To draw the trace at section planes,

G; Continuous Thin Zigzag Line: It is used when free hand lines are drawn by tools

H; Free Hand Line: Limits of partial and interrupted views and sections

I; and J; Parts situated in front of the cutting planes, outlines of adjacent parts, Censorial Lines, to state center of gravity.

Evaluation question

Q.1 what is free hand sketching

Q.2 name the instruments used in free hand sketching

Q.3 describes the techniques of sketching a straight line and a circle.

Ideal ways of storing drawing instruments and materials:-

1. Pencils, Pens, and Brushes
    - Use pen and brush holders, pencil cases, and drawer organizers.
2. Paper and Sketchbooks.
    - Store paper flat in drawers or on shelves, use vertical files, and dedicate a shelf for sketchbooks,
3. Erasers, Sharpeners, and Small Tools
    - Use small containers and drawer dividers.
4. Markers and Colored Pencils
    - Utilize marker trays, colored pencil rolls, and plastic storage boxes,
5. Paints and Palettes
    - Store in stackable bins, boxes, or small drawer units.
6. Larger Equipment
    - Store easels and drawing boards in a dedicated corner or against a wall, and use tool carts for mobility.