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DEPARTMENT: MECHATRONICS ENGINEERING

MATRIC NO: 18/ENG05/015

ENG 232 (ENGINEERING DRAWING) ASSIGNMENT

SOLUTION

1. **HOW TO REPRESENT A SECTIONED SURFACE ON A DRAWING?**

Section lines or cross-hatch lines (at 45 degrees) are added to a section view to indicate surfaces that are cut by the imaginary cutting plane.

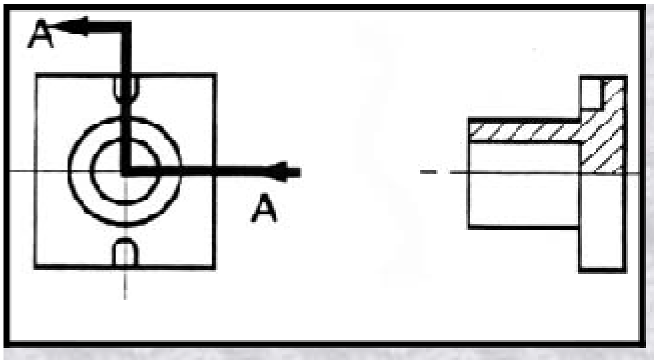
2. **PRINCIPLES OF DIMENSIONING**

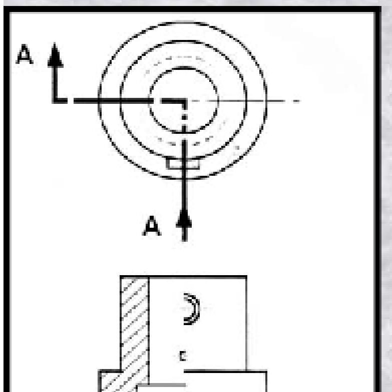
a. Dimensions and projection lines are narrow continuous lines 0.35mm thick, if possible, clearly placed outside the outline of the drawing.
b. Arrowhead should be approximately rectangular, must be uniform size and shape and in every case touch the dimension lines to which they refer.
c. Arrowhead drawn manually should be filled in, arrowheads drawn by machine does not need to be filled in.
d. Adequate space must be left between rows of dimensions and a spacing of about 12mm is recommended.
e. Centre lines must never be used as dimension lines but must be left clear and distinct.
f. Dimensions are quoted in millimeters to the minimum number of significant figures.
g. To enable dimensions to be read clearly, figures are placed so that they can be read from the bottom of the drawing.
h. Dimensions should not be duplicated nor should the same information be given in two different ways.
i. Dimensions should be attached to the view that best shows the contour of the feature being dimensioned.
j. Wherever possible, avoid dimensioning to hidden lines.
k. Avoid dimensions over or through the object.
l. Wherever possible, locate dimensions in adjacent views.
m. In general, a circle is measured by its diameter circle with line through it and arc by its radius R0.50.
n. Holes are located by their centerlines, which may be extended and used as an extension line.
o. Holes should be located and sized in the view that shows that feature as a circle.

3.

HALF SECTION

A half-section is a view of an object showing one-half of the view in section, as in the drawing below. The diagonal lines on the section drawing are used to indicate the area that has been theoretically cut. These lines are called section lining or cross-hatching. The lines are thin and are usually drawn at a 45-degree angle to the major outline of the object. The spacing between lines should be uniform. A second, rarer, use of cross-hatching is to indicate the material of the object. One form of cross-hatching may be used for cast iron, another for bronze, and so on. More frequently, the type of material is indicated elsewhere on the drawing, making the use of different types of cross hatching unnecessary. Usually hidden (dotted) lines are not used on the cross-section unless they are needed for dimensioning purposes. Also, some hidden lines on the non-sectioned part of the drawings are not needed (second figure) since they become redundant information and may clutter the drawing.

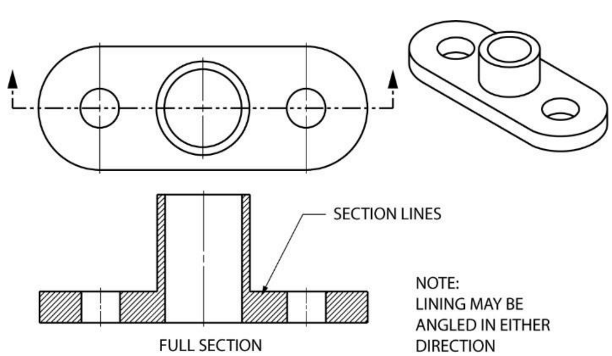




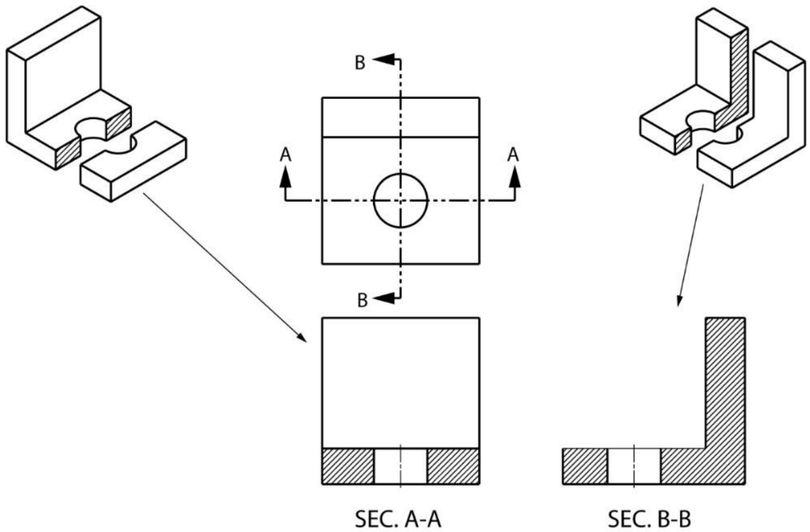
Without ‘hidden lines’

FULL SECTION

If the imaginary cutting plane passes through the entire object, splitting the drawn object in two with the interior of the object revealed, this is called a "full section." A full section is the most widely-used sectional view. When a cutting plane line passes entirely through an object, the resulting section is called a full section. Fig below illustrates a full section.



It is possible to section an object whenever a closer look intentionally is desired. Here is an object sectioned from two different directions.



4. **<u>HOW ARE LEADER LINES TERMINATED?</u>**

Leader lines terminate in an arrowhead, dot or without both. Arrow heads are used when leader lines terminate at the outline of an object. Dots are used when leader lines terminate within the outline of the object or on the surface of the object. Leader lines terminate without a dot or an arrowhead on a dimension line.

5.

scale=5:1 – this means that 5cm/mm (it could be in any unit) of the drawing of the object will be equal to 1cm/mm of the object in real life. This is a reduced scale.

scale=1:10 – this means that 1cm of the drawing of the object will be equal to 10cm of that object in real life. It is a magnified scale.

6. **<u>SHAPE IDENTIFICATION SYMBOLS</u>**

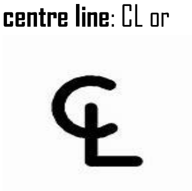
a. **diameter**: 

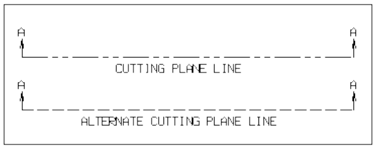
b. radius: R

c**. square**: 

d**. spherical radius**: SR

centre line: CL or



cutting plane line: 

long break: 

7.

ELEMENTS TO BE CONSIDERED WHILE OBTAINING A PROJECTION

1. The object
2. The plane of projection
3. The point in space or point of sight
4. The projector or rays of sight

   Other elements to be considered while obtaining a projection include;
5. The three principle axis such as height axis, length axis and width axis.
6. Technicality of the projection.
7. Ease of computerization.
8. Position of the projections from the object.

ORTHOGRAPHIC PROJECTION

Orthographic projections (also referred to as orthogonal projections) is a means of representing three-dimensional objects in two dimensions.

It is a form of parallel projection, in which all the projection lines are orthogonal to the projection plane resulting in every plane of the scene appearing in affine transformation on the viewing surface.

8. **WHEN IS A PROJECTION OF AN OBJECT CALLED AN ORTHOGRAPHIC PROJECTION**

The projection of an object is said to be orthographic if different views of the object are projected on different reference planes, observed perpendicular to respective reference plane.

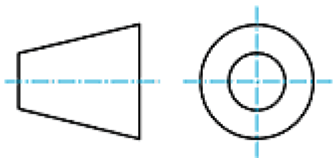
9.

a. **FIRST ANGLE PROJECTION**

In this method, the object is placed in the first quadrant and is positioned in front of the vertical plane. This means the object is placed between the plane of projection and the observer. It is one of the most common methods used to obtain engineering drawings, mostly for orthographic projections.

The plane of projection is supposedly opaque. This means that the object is placed in front of the planes and each view is pushed through the object which places the vertical plane behind the object and pushes the horizontal plane underneath. It is one of the ways of representing three-dimensional objects with respect to two dimensions.

The orthographic view is projected on a plane located beyond the object and the observer is on the left side of the object and projects the side view on a plane beyond the project. The right side view is projected to the left of the front view and the top view is projected onto the bottom of the front view.



First angle

b. **THIRD ANGLE PROJECTION**

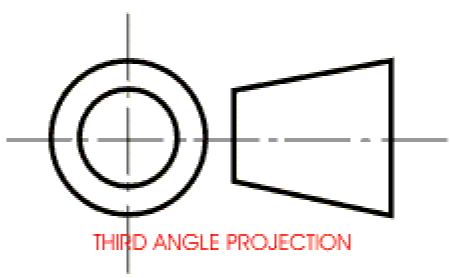
this is a method of orthographic projection which is a technique in portraying a 3D design using a series of 2D views. The design gradually unfolds to present a series of 2D views in the 3rd angle projection.

3rd angle projection is where the 3D object is seen to be in the 3rd quadrant. It is positioned below and behind the viewing planes, the planes are transparent and each view is pulled onto the plane closest to it. The front plane of projection is seen to be between the observer and the object.

The 3D object to be projected is placed in the third quadrant and is positioned behind the vertical plane and below the horizontal plane. The planes are transparent.

The observer is on the right side of the object and the orthographic view is projected on a plane located between the view point and the object. The right view is projected onto the right side of the front view and the top view is projected above the front view.

The 3rd angle projection symbol shows the orientation of a cone in the 3rd angle projection.



THIRD ANGLE PROJECTION

OBJECTIVES

1. (a) Reference plane
2. (b) false
3. (c) directly
4. (b) 120 degrees
5. (a) 60 degrees
6. (b) rivet

7. (c) crowning
8. (b) 45 degrees
9. (a) a circle
10. (a) an ellipse
11. (c) cylinder
12. (a) cone
13. (c) pivot bearing
14. (c) 55 degrees
15. (d) horizontal plane