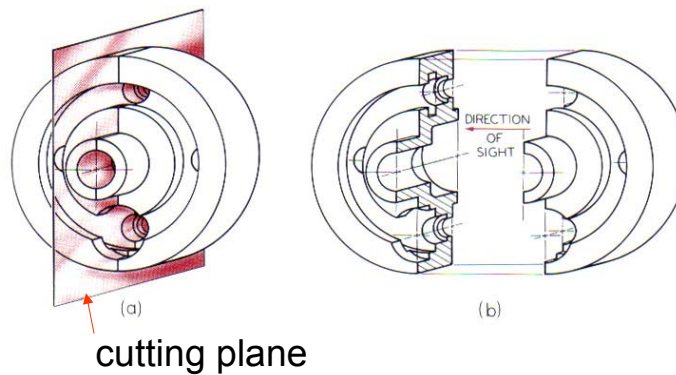


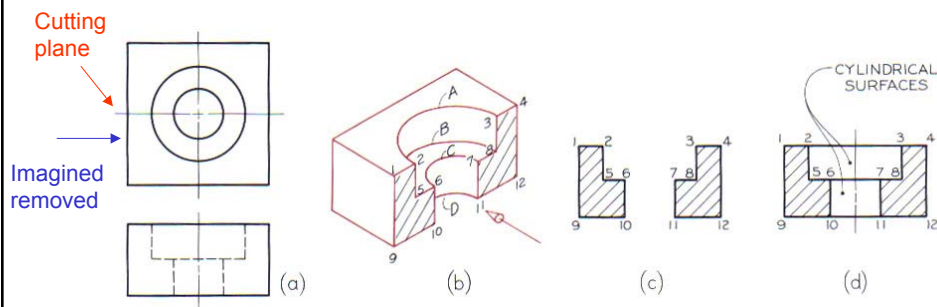


## Session 9 : Sectional drawing

- If the drawing cannot fully show the interior detail of object, a sectional view (slicing through the object) is drawn to reveal the interior detail.



## Visualizing a section



1) The cutting plane is assumed along the horizontal center line in the top view

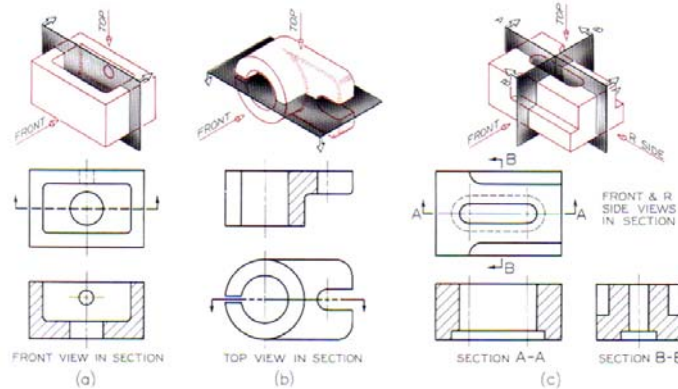
2) The lower half of the top view is imagined removed

3) Two cut surfaces are 1-2-5-6-10-9 & 3-4-12-11-7-8

4) Complete visible lines 2-3, 6-7, 5-8, & 10-11



## Cutting plane & cutting-plane line

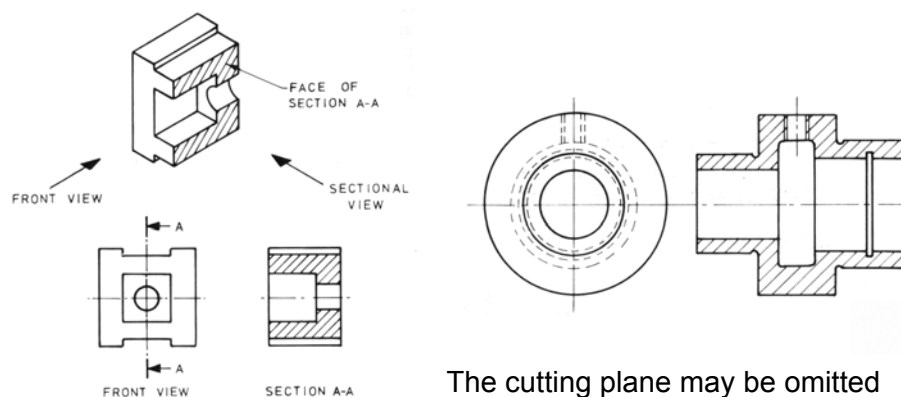


Each section  
is  
independent  
of the other

- Cutting-plane line is denoted by a chain line (type H), thick at ends
- Arrowheads indicate the direction in which the cutaway object is viewed.
- When a cutting-plane line coincides with a center line, the cutting-plane line take precedence.



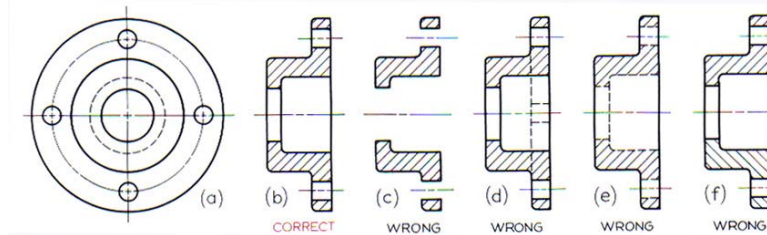
## Representation of a sectional view



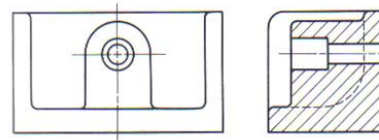
The cutting plane may be omitted  
when it is obvious that the section  
can only be taken at one location  
→ center line (for this case)



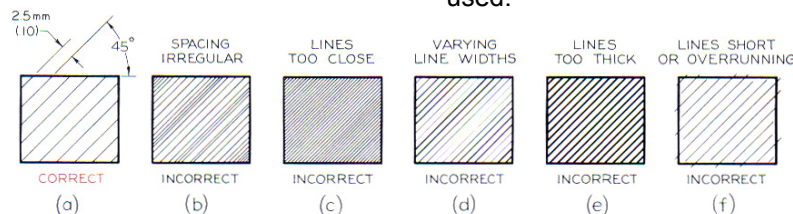
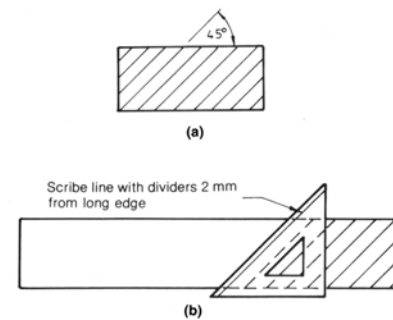
## Lines in sectioning



- All visible edges and contours behind the cutting plane should be drawn.
- Hidden lines should be omitted in sectional views. Sometimes hidden lines, which are necessary for clearness, should be drawn. ➔



## Hatching lines



- Hatching lines are “thin line” (type B), and are normally drawn 45° to the horizontal, right or left.
- Hatching lines are shown only the part in contact with the cutting plane.
- If the shape of the section would bring the hatching lines parallel to one or more of the sides, another angle may be used.

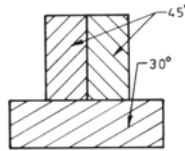


## Special application of hatching lines

For adjacent parts, hatching on one part should be at right angles to the hatching on the other part



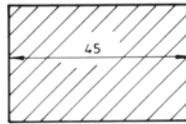
(a)



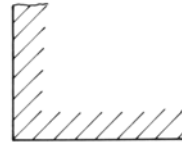
(b)

For more than two adjacent parts, vary the angle and/or the spacing of hatching lines

Dimensions may be inserted in hatching area by interrupting the hatching lines.



(c)

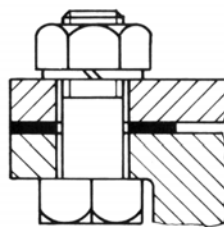


(d)

For large area, place hatching lines around the edges of the area



## Hatching of thin parts



(a)

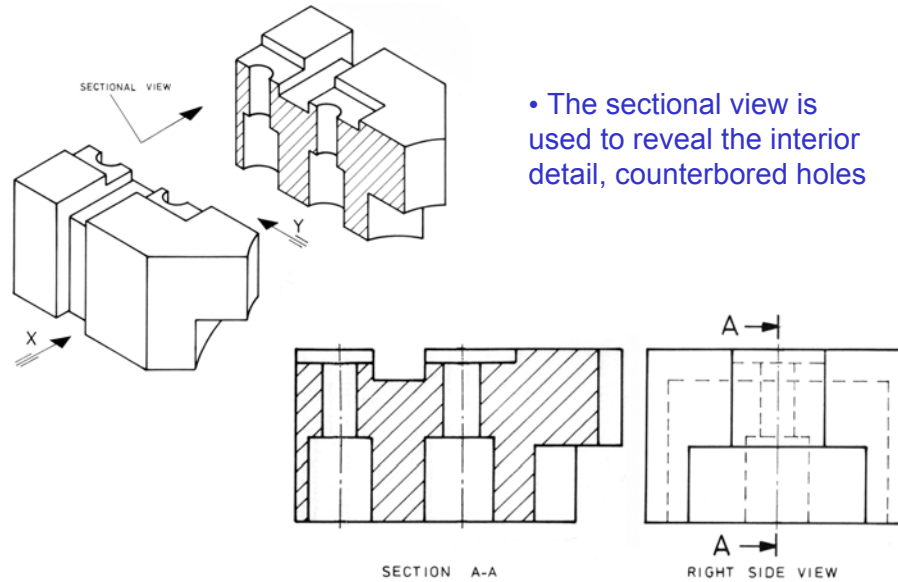


(b)

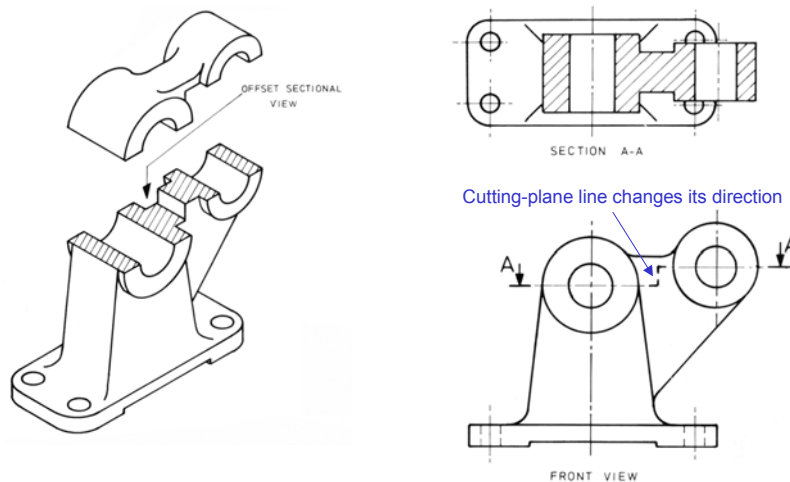
- For very thin area, e.g. gaskets, plastic sheet, packing, sheet metal, these areas should be filled dark.
- A small space should be left between thin adjacent parts



## Pictorial & orthogonal views of full section



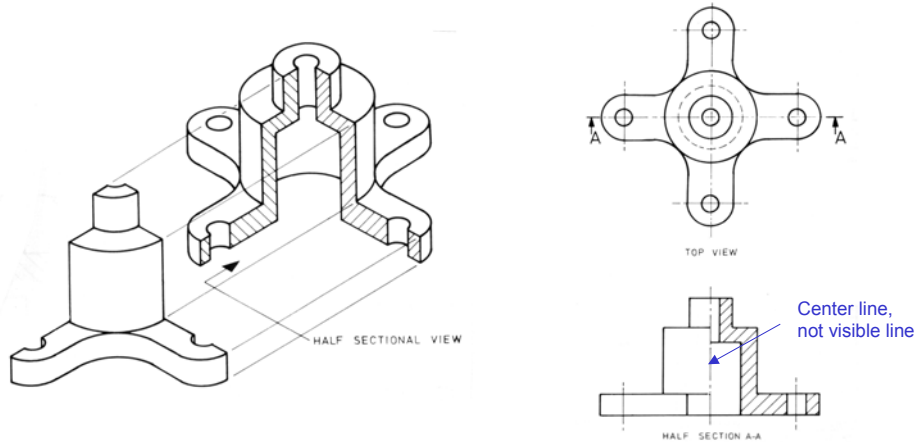
## Pictorial & orthogonal views of offset section



- An offset cutting plane is used to reveal the detail of the two bosses.



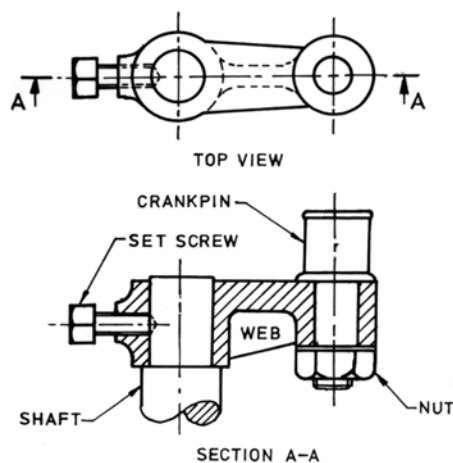
## Pictorial & orthogonal views of half section



- Half sectional view is often used on objects which are symmetrical about a center line.
- Division between the external half & internal half is shown by the center line.



## Exceptions to the general rule of sectioning

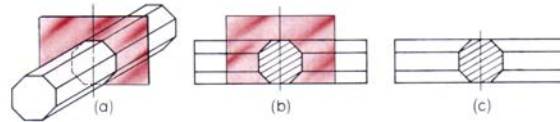


When the cutting plane passes through the center of webs, shafts, bolts, rivets, keys, pins, and similar parts, they are not shown sectioned but in outside view

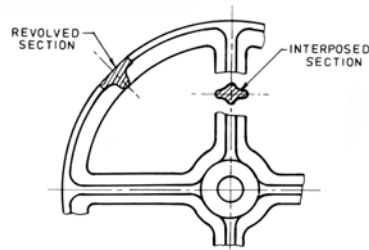


## Revolved and interposed sections (I)

The shape of cross section of a bar, arm, rib may be shown in the longitudinal view.



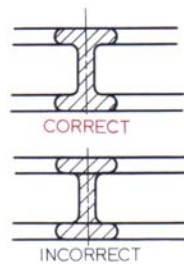
Assume a plane perpendicular to the axis of the bar, then revolve the plane through  $90^\circ$



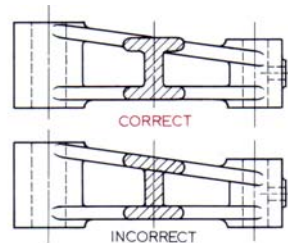
- **Interposed section:** detail adjacent to it is removed, is drawn using a thick line (type A)
- **Revolved section:** it is drawn with adjacent detail using a thin line (type B)



## Revolved and interposed sections (II)



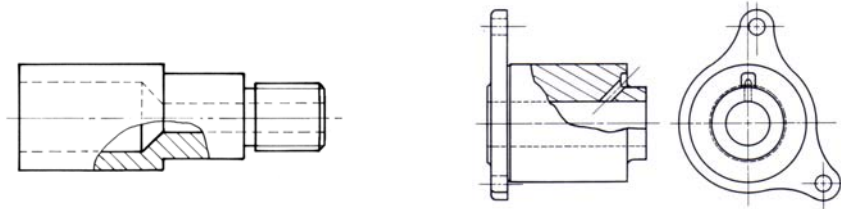
- The superimposition of the revolved section requires the removal of all original lines covered by it.



- The true shape of a revolved section should be retained after the revolution of the cutting plane.



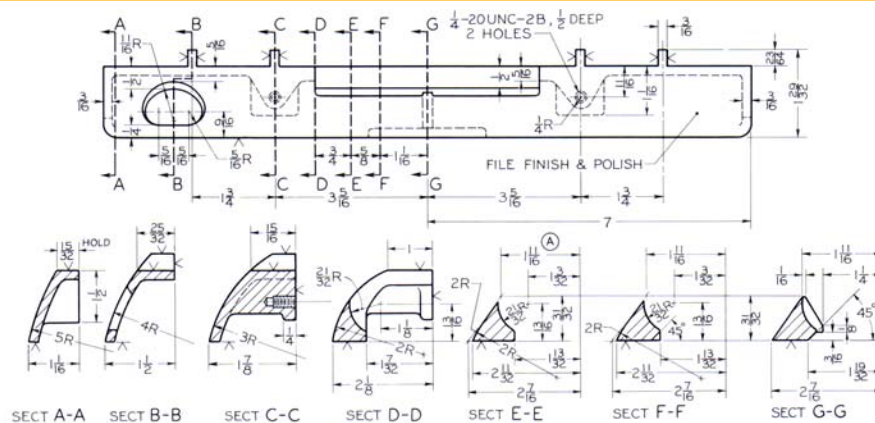
## Part or local sections



- If the space is limited, partial view may be used.
- The boundary of the section is drawn freehand using a type C line.



## Removed sections

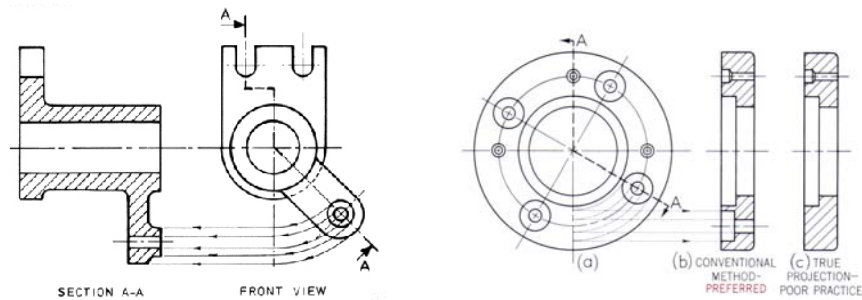


- Removed section should be labeled corresponding to the letters at the ends of the cutting-plane line
- A removed section is often a partial section





## Aligned sections

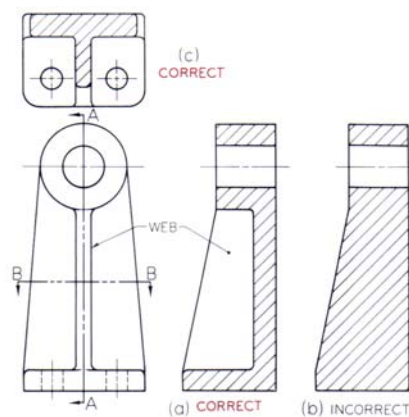


- To include detail on a sectional view which is not located along one plane, the cutting plane may be bent to pass through such detail.
- To indicate the cutting plane, heavy lines are used where the plane changes direction.

Note: the projection lines would not be shown on the finished drawing



## Ribs in section

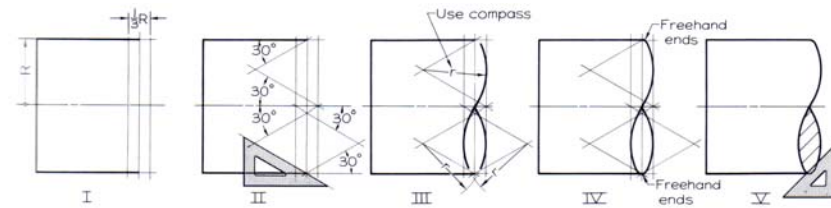


- For flat features, such as ribs, webs, gear teeth, they are not sectioned even though the cutting plane passes along the center plane of the feature (plane A-A).

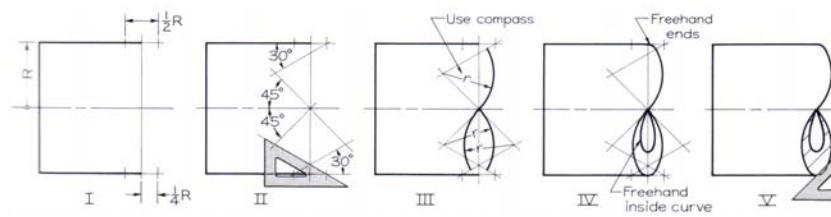
- If the cutting plane passes crosswise through any thin member (plane B-B), the member should be section-lined in the usual manner.



## S-Breaks for solid and tubing



(a) S-Break for solid



(b) S-Breaks for tubing