

Computer Aided Machine Drawing

3- Sectional Views



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Introduction



- Orthographic views when carefully selected, may reveal the external features of even the most complicated objects.
- However, there are objects with complicated interior details and when represented by hidden lines, may not effectively reveal the true interior details.
- This may be overcome by representing one or more of the views 'in section'.

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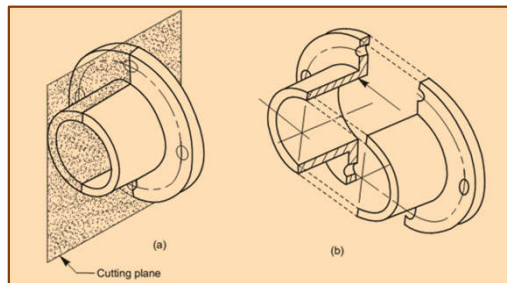
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Principles of Sectioning



- A sectional view is obtained by imagining the object, as if cut by a cutting plane and the portion between the observer and the section plane being removed.



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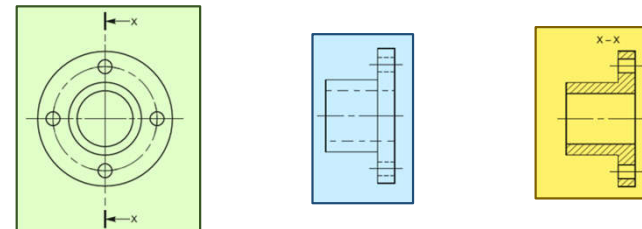
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Full Sectioning



- A sectional view obtained by assuming that the object is completely cut by a plane is called a full section or sectional view.
- The sectioned view provides all the inner details, better than the un-sectioned view with dotted lines for inner details



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Full Sectioning



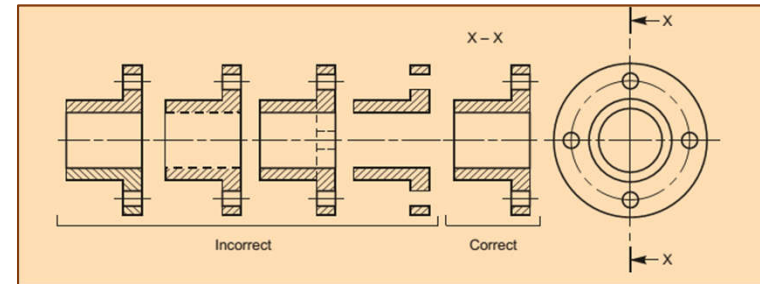
- It may be noted that, in order to obtain a sectional view, only one half of the object is imagined to be removed but is not actually shown removed anywhere except in the sectional view.
- Further, in a sectional view, the portions of the object that have been cut by the plane are represented by section lining or hatching. The view should also contain the visible parts behind the cutting plane.
- Sections are used primarily to replace hidden line representation, hence, as a rule, hidden lines are omitted in the sectional views.

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Full Sectioning



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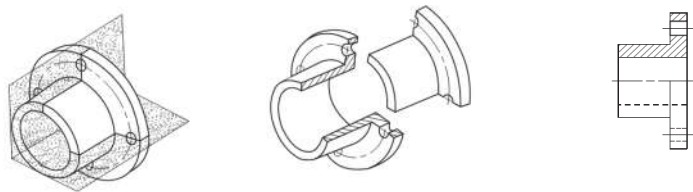
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Half Sectioning



- A half sectional view is preferred for symmetrical objects. For a half section, the cutting plane removes only one quarter of an object.
- For a symmetrical object, a half sectional view is used to indicate both interior and exterior details in the same view. Even in half sectional views, it is a good practice to omit the hidden lines.

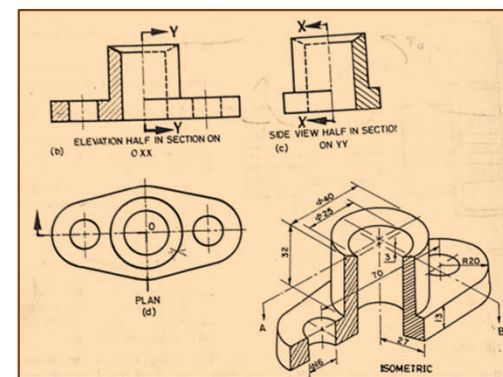


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Half Sectioning



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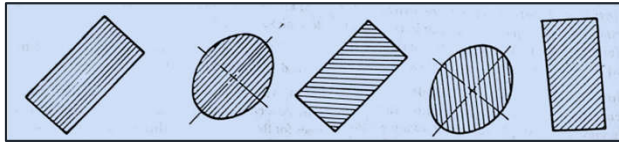
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Rules of Sectioning



- Section lines should be thin to obtain contrast with outlines and should normally be drawn at an angle of 45° .
- When the shape of the object is odd and section lines drawn at 45° become parallel to the outline of the object, the angle may be different.
- The pencil used for section lines may be a grade harder (3H for section lines, when 2H for outlines) to obtain thinness.



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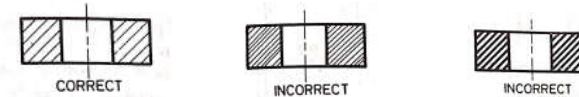
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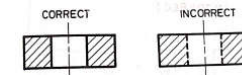
Rules of Sectioning



- The spacing of section lines should be uniform as shown in the figure. It may vary from one mm in small drawings to 3 mm or more enlarged drawings.
- For an average drawing spacing of about 2 mm is good.



- No sectional area can ever be bounded by dash lines.



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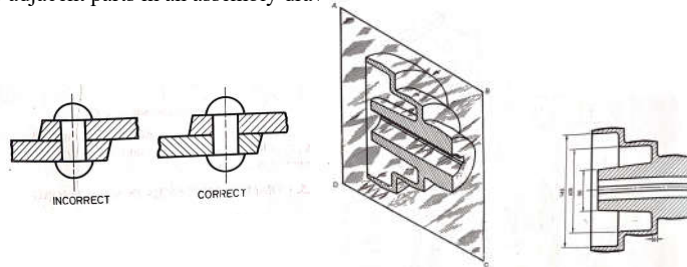
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Rules of Sectioning



- All sectioned areas in a view of a single piece must be sectioned in the same direction. Also section lines for the same piece in different views must be in the same direction.
- Two adjacent parts in an assembly drawing are hatched in opposite direction



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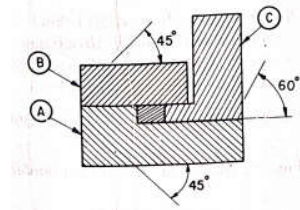
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Rules of Sectioning



- The hatching is at an angle of 45° with the main outlines of the view (marked A). On a second part, adjacent to the first, the section lines are drawn at an angle of 45° in the opposite direction (marked B). Only third part, adjacent to the first two, the lines are drawn at an angle of 30° or 60° , with the main outlines of the view (marked C). For additional adjacent parts, any suitable angle may be used to make each part stand out separately and clearly.



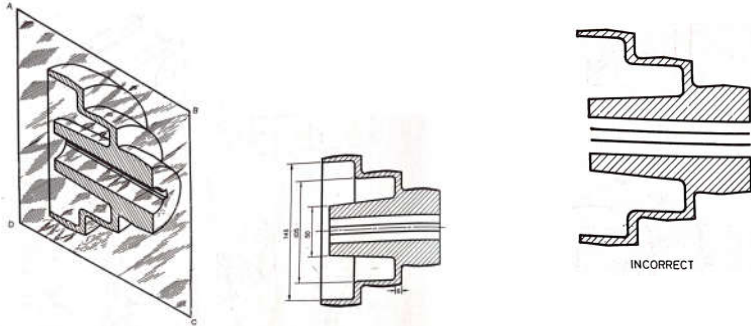
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Rules of Sectioning

- The visible edges and contours behind the cutting plane must be shown.



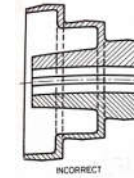
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Rules of Sectioning

- Hidden details should not be shown in sectional views unless necessary for the description and understanding of the object.



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Rules of Sectioning

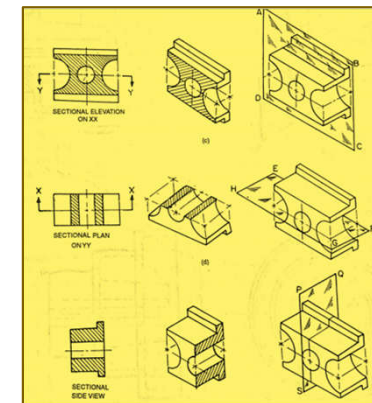
- The cutting plane with reference letters and arrows should be indicated in the other view as a line unless it is obvious.
- Sometimes more than one view of the object is shown in the section. In such cases, each section is to be considered separately without reference to what has been removed for the other view.

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Rules of Sectioning



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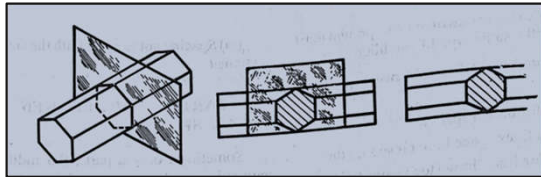
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Rules of Sectioning



- Revolved section is used to show the cross section of objects like arms, spokes, structural sections etc., on the actual view of the path thus avoiding the drawing of another view.
- In the revolved section, a cutting plane is assumed perpendicular to the centre line or axis which is then revolved through 90° .

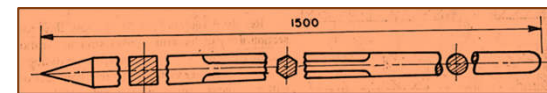
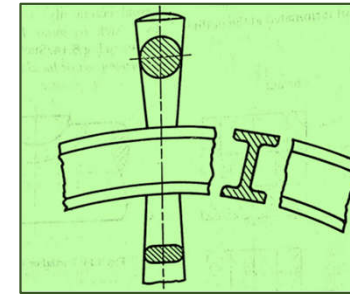


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Revolved section-view broken way



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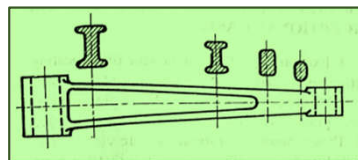
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Removed Section



- Removed section also shows the cross section of an object, like revolved section, but outside the view. The removed section is generally drawn around the extension of the cutting plane.



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Advantages of removed section



- It keeps the view intact.
- The removed section may be drawn to a larger scale, if necessary, to show the shape clearly or clear dimensioning.
- The removed section may be used where revolved section cannot be drawn due to restriction of space.

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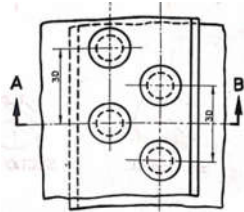
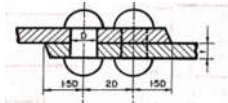
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Offset Section



- In an object, there may be several features which are not in one continuous straight line. If all these features are to be shown a number of sections may have to be taken.
- However, all the features may be shown in one section if instead of one straight cutting plane, a bent or offset cutting plane is taken which passes through all these features as shown in figure.



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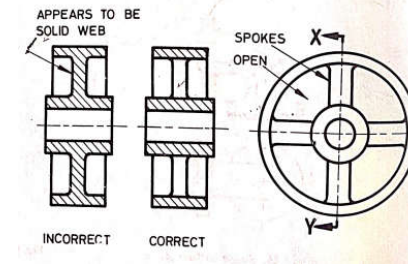
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Sectioning of Ribs, Webs and Spokes



- The spokes of a wheel are not sectioned because otherwise they would not show the open effect of spokes and would give the appearance of solid web.



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*Thanks for your
kind attention*

Dr. Chandan Sharma

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