

## Sections and sectional views

A section is used to show the detail of a component, or an assembly, on a particular plane which is known as the cutting plane. A simple bracket is shown in Figure 4.1 and it is required to draw three sectional views. Assume that you had a bracket and cut it with a hacksaw along the line marked B-B. If you looked in the direction of the arrows then the end view B-B in the solution (Figure 4.2), would face the viewer and the surface indicated by the cross hatching would be the actual metal which the saw had cut through. Alternatively had we cut along the line C-C then the plan in the solution would be the result. A rather special case exists along the plane A-A where in fact the thin web at this point has been sliced. Now if we were to cross hatch all the surface we had cut through on this plane we would give a false impression of solidity. To provide a more realistic drawing the web is defined by a full line and the base and perpendicular parts only have been cross hatched. Note, that cross hatching is never undertaken between dotted lines, hence the full line between the web and the remainder of the detail. However, the boundary at this point is theoretically a

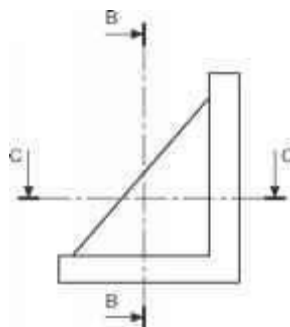


Figure 4.1 A simple bracket

dotted line since the casting is formed in one piece and no join exists here. This standard drawing convention is frequently tested on examination papers.

Cutting planes are indicated on the drawing by a long chain line 0.35 mm thick and thickened at both ends to 0.7 mm. The cutting plane is lettered and the arrows indicate the direction of viewing. The sectional view or plan must then be stated to be A-A, or other letters appropriate to the cutting plane. The cross hatching should always be at 45° to the centre lines, with continuous lines 0.35 mm thick.

If the original drawing is to be microfilmed successive lines should not be closer than 4 mm as hatching lines tend to merge with much reduced scales. When hatching very small areas the minimum distance between lines should not be less than 1 mm.

In the case of very large areas, cross hatching may be limited to a zone which follows the contour of the hatched area. On some component detail drawings it may be necessary to add dimensions to a sectional drawing and the practice is to interrupt the cross hatching so that the letters and numbers are clearly visible.

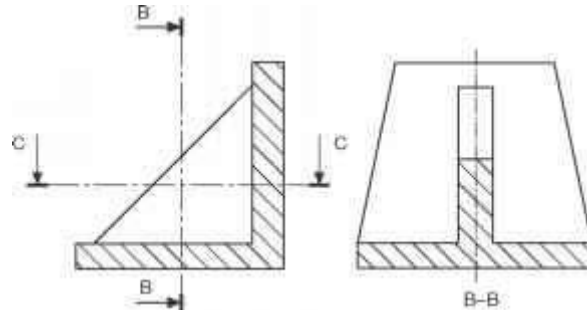


Figure 4.2 Sectional view for a simple bracket

### Section views

Section views, commonly called sections, show internal features of parts, or assemblies, that are not easy to be shown clearly and dimensioned by the traditional orthographic views.

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Where the location of a single cutting plane is obvious, no indication of its position or identification is required.

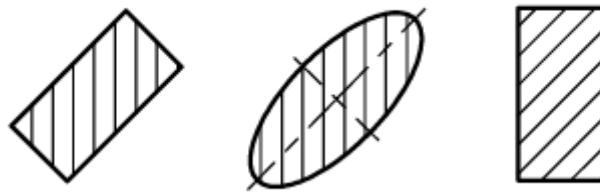
Some **notes of Sectioning** are:

- A section lined area is always completely bounded by a visible outline.
  - The section lines in all areas should be parallel. Section lines shown in opposite directions indicate a different part.
  - All the visible edges behind the cutting plane should be shown.
  - Hidden features should be omitted in all areas of a section view.
  - Some of the items such as shafts, fasteners, rivets, keys, ribs, webs, and spokes, not usually sectioned.
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### Notes on hatching of sections

Hatching is generally used to show areas of sections. The simplest form of hatching may be based upon continuous thin lines at a convenient angle, preferably 45°, to the principle outlines of symmetry of sections.

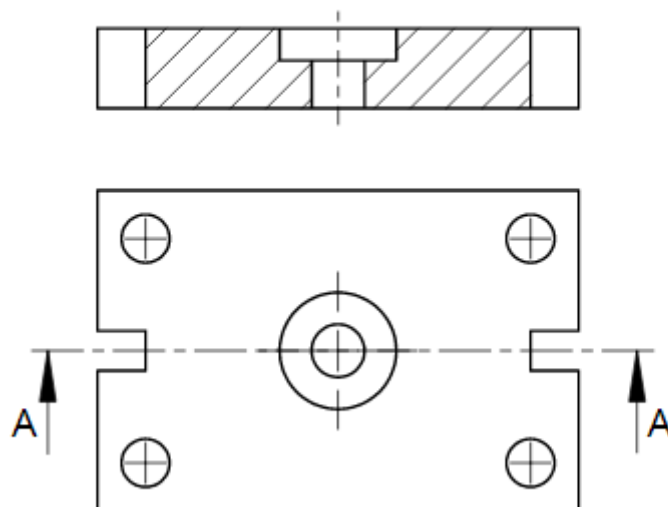
Hatching may be used to indicate type of materials, in sections. If different types of hatching are used to indicate different materials, the meaning of this hatching shall be clearly defined on the drawing, or by reference to appropriate standards.



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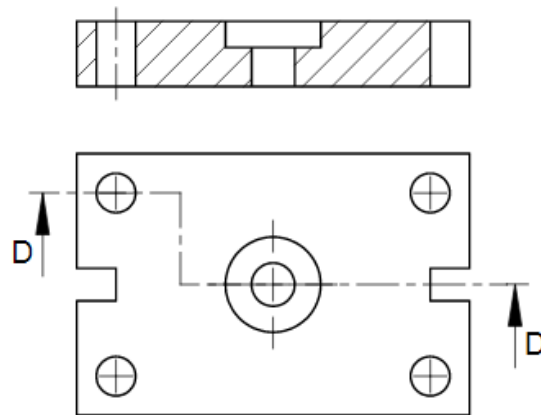
### Full sections

When the cutting plane extends entirely through the object in a straight line and the front half of the object is theoretically removed, a full section is obtained. This type of section is used for both detail and assembly drawings. When the cutting plane divides the object into two identical parts, it is not necessary to indicate its location.



### Offset sections

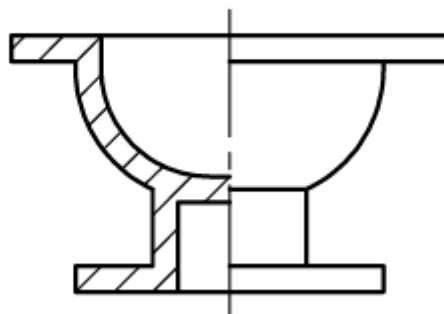
This type of sectioned view appears to be a full section. In order to include features that are not in a straight line, the cutting-plane line may be offset or bent, so as to include several planes or curved surfaces.



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### Half Sections

**Symmetrical parts** may be drawn half in section and half in outside view. This type of drawing avoids the necessity of introducing dotted lines for the holes and the recess. Dimensioning to dotted lines is not a recommended practice.



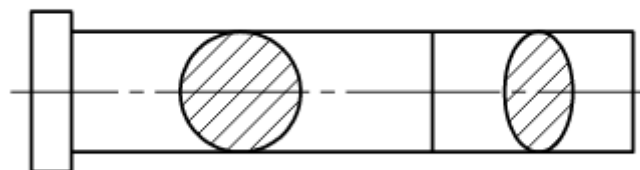
## Local sections

It is not always necessary to draw a complete section through a component if a small amount of detail only needs to be illustrated. The local section or **broken-out** section of a view has the appearance of having been hit with a hammer to break a small part from the object. Rather than create a section through the entire part, only a localized portion of the object is sectioned.



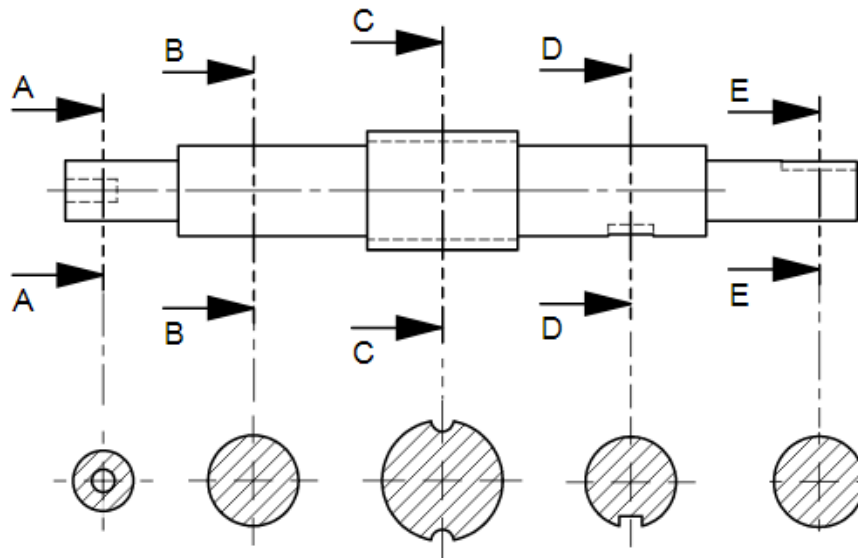
## Revolved sections

A revolved section is shown the shape of the cross section at that point. This is a convenient convention to use on single view drawings because the shape could not be confirmed without projecting a second view or an added note.



### Successive sections

Successive sections may be arranged as convenient for the layout and understanding of the drawing. Note that where successive sections are drawn, each view only gives the detail at that section plane and not additional background information.



### Thin sections

Many products are manufactured from very thin materials which would be virtually impossible to cross hatch in a sectional view and in these cases it is usual to make them entirely black. Where however two or more thin sections are adjacent to each other, a gap is left so that the profile of the separate components is clearly defined. A space of not less than 0.7 mm must be left between adjacent sections of this type.

