

**Prince Sattam Bin
Abdul-aziz University**



**College of Engineering
Mechanical Engineering**

***LECTURE NOTES 2: MECHANICAL ENGINEERING DRAWING
AND GRAPHICS (ME 2421)***

Lecture 1: Sectional view and types of sections

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Chapter Outline



1- Sectional view

- ➔ Full section, Half section, offset section,
- ➔ Part section, Revolved section, Part not sectioned

2- Types of sections

3- Applications

Sectional view



Upon completion of this chapter, the student is expected to:

- Know the reason for using a sectional view;**
- Be able to sketch a full-sectional view of an object;**
- Be able to sketch a half-sectional view of an object;**
- Know the sectioning rules and conventions;**
- Identify the different types of sections, such as full, half, offset, revolved, and so forth.**

Sectional view



- We have covered the basic method of representing an object by projecting views. This allows us to see the external features of an object.
- Often times it is necessary to view the internal features, this is accomplished by slicing through the object and producing a sectional view.
- 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. We look in the direction of the arrows then the end view (A-A, B-B, ...) will face us.

Definitions

- A section is an imaginary cut taken through an object to reveal the shape or interior construction. **Fig. 2a** shows the **imaginary cutting plane** in perspective view.
- The imaginary cutting plane is projected on a standard view so that the **sectional view** with orthographic representation is obtained as shown in **Fig. 2c**.
- A sectional view must show which portions of the object are solid material and which are spaces. This is done by **section lining (cross-hatching)** the solid parts with uniformly spaced thin lines generally at 45° .

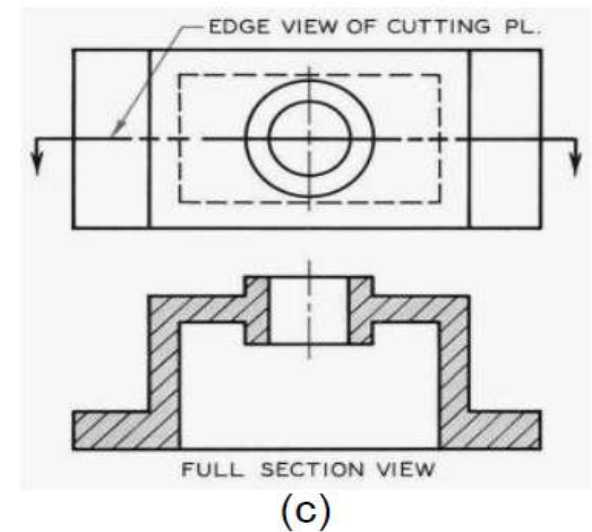
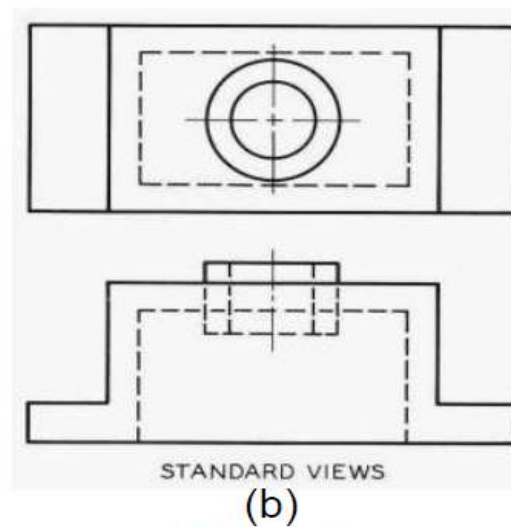
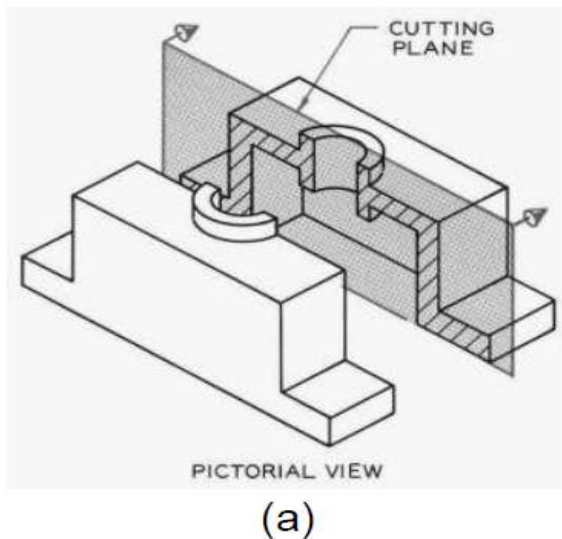


Figure 2

Cutting Planes

- Various cutting planes can be selected for obtaining clear sectional views.
- The plane may cut **straight across (Fig. 3a)** or **be offset (changing direction forward and backward)** to pass through features (**Fig. 3b, 3c and 3d**).
- The plane may also be taken parallel to the frontal plane (**Fig. 4a**), parallel to the profile and/or horizontal plane (**Fig. 4b and 4c**), or at an angle.

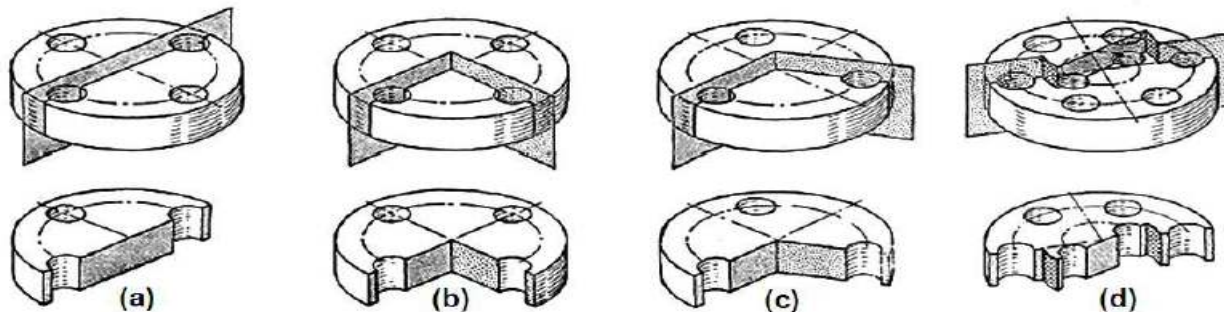


Figure 3

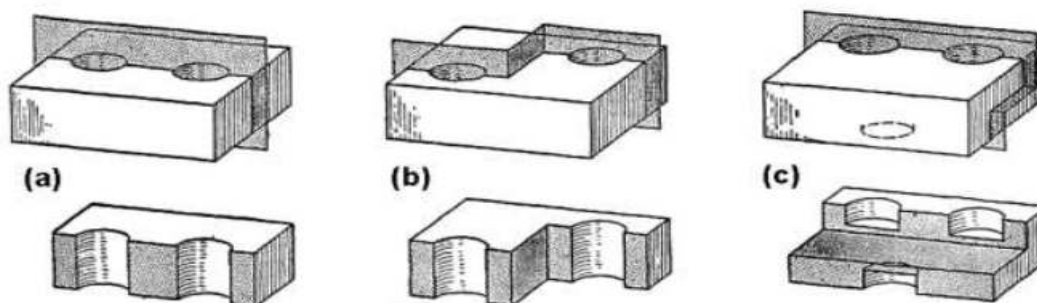


Figure 4

2- Types of Sections:

- Depending on the number of cutting planes, sectional views can be **simple with one cutting plane (Fig. 5)** or **complex with two or more cutting planes (Fig. 6)**.
- If the cutting plane-line cuts entirely across the object, it is called a **full section**.
- If the cutting plane cuts halfway through the object, it is a **half section**.
- In addition to these, there are **broken-out sections**, **rotated sections**, **removed sections**, **auxiliary sections**, and **assembly sections**.

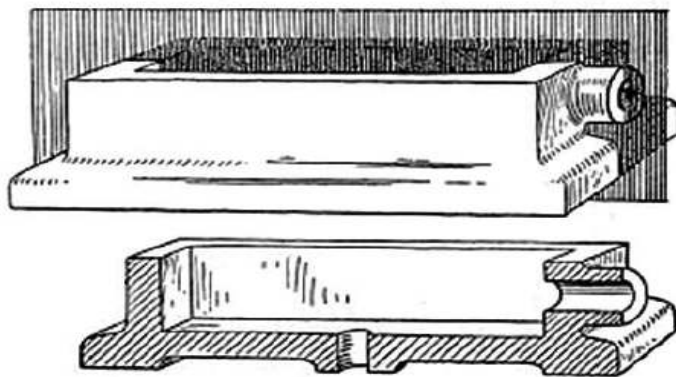


Figure 5

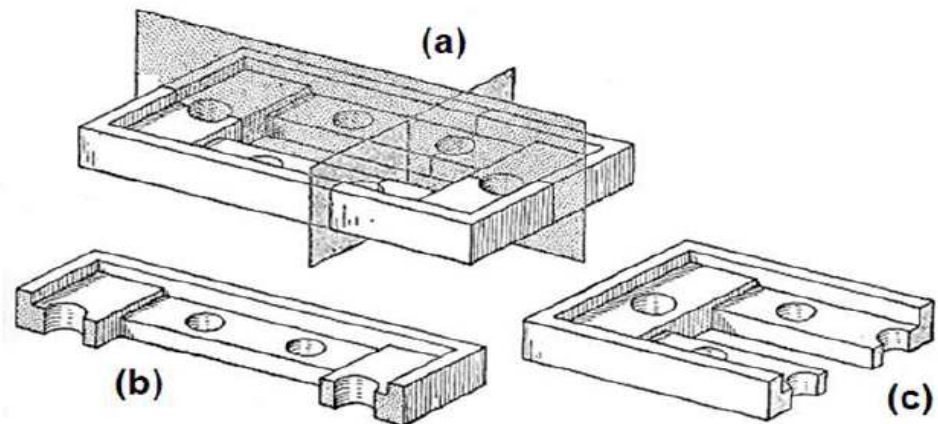
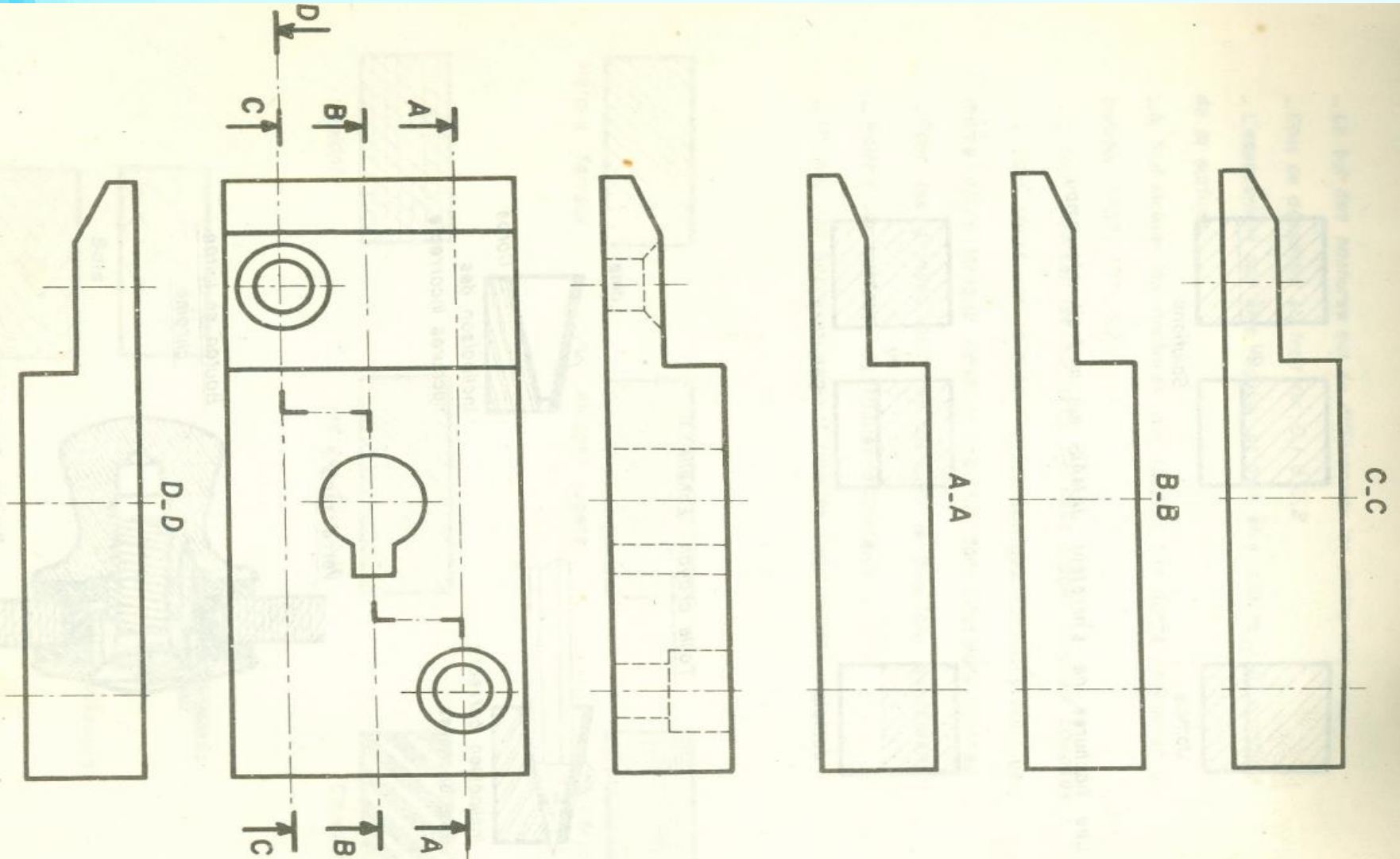


Figure 6

Application:



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Full Section:

- When cutting plane passes **fully through an object**, it is called full section (**Fig. 7**).

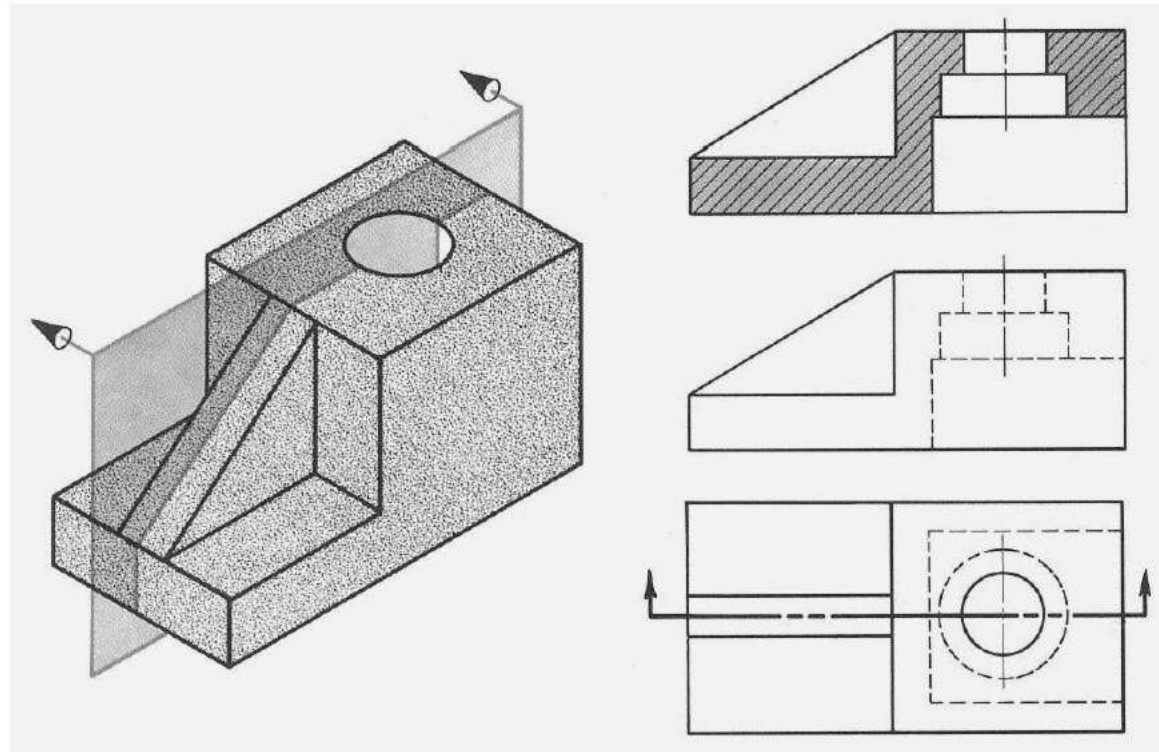
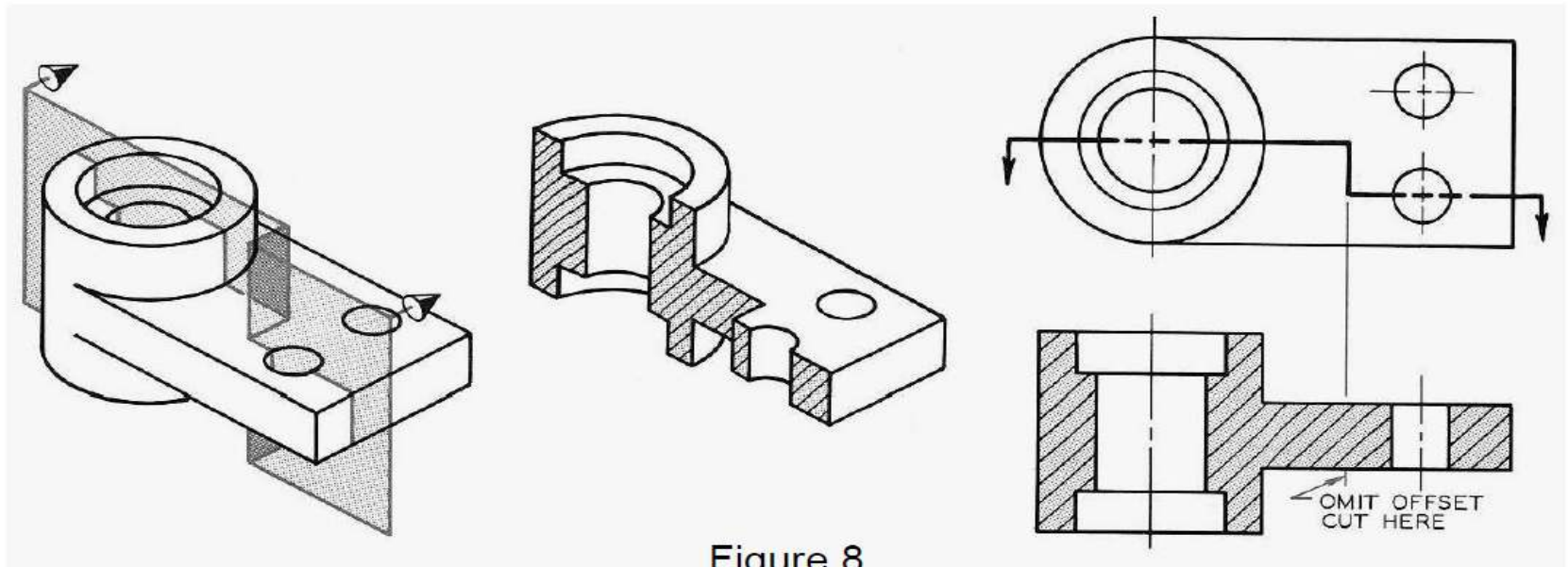


Figure 7

Full Section with Offset Planes

- The cutting plane may be offset in any portion in order to show some detail or to miss some part, as seen in **Fig. 8**.
- Note that the change in plane direction is not shown on the sectional view (i.e. **no edge is present** on the object at this position since the cut is purely imaginary).



Half Section:

- A half section is made by **cutting halfway** through an object (**Fig. 11**).
- Thus, **one half is drawn in section** and the other half is an outside view.
- Usually, **hidden lines are not used** (inside details are visible on the section view).

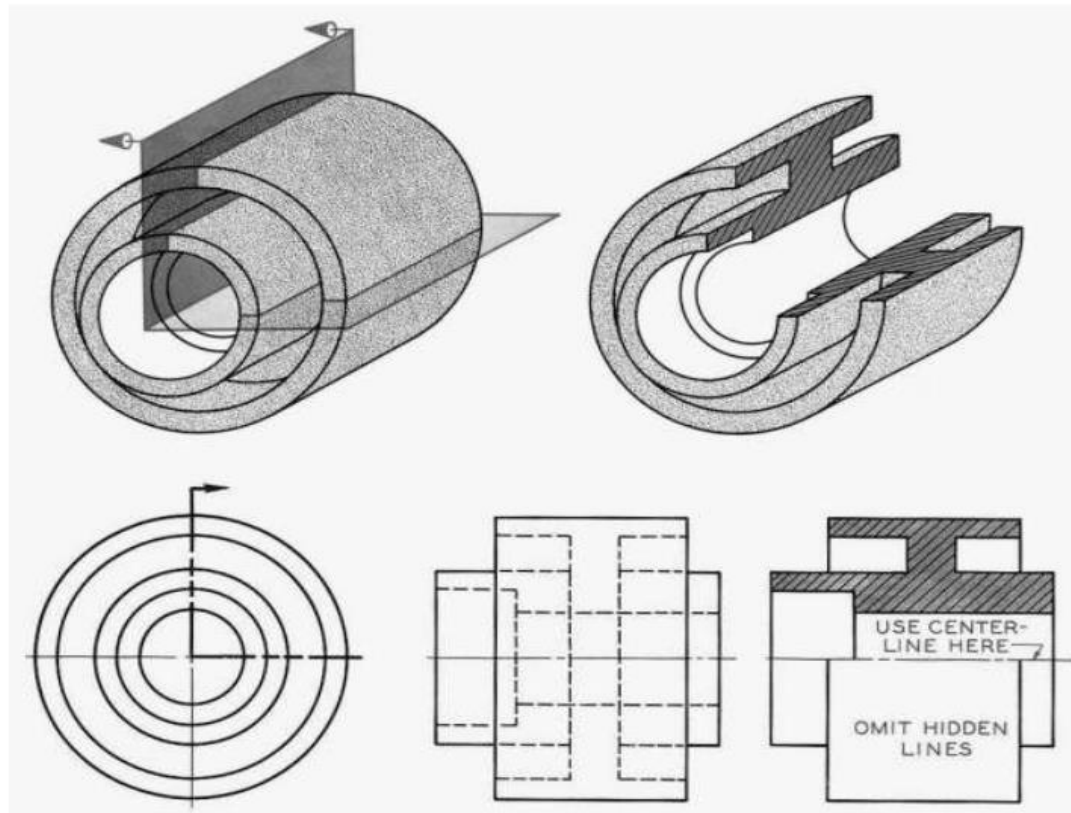


Figure 11

Broken-Out Section

- This type of section shows **only an interior portion** of the object in section.
- Cutting plane passes **partially** through the object. The area immediately in front of the plane is **broken and removed**, which reveals interior details in this area.
- At the point where the object is considered broken, an **irregular break line is used** to indicate the break.
- **Fig. 14 and 15** illustrate the advantage of the broken-out section, which eliminates the need for excessive section lining.

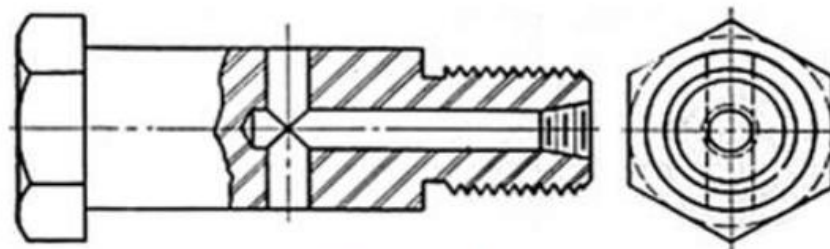


Figure 14

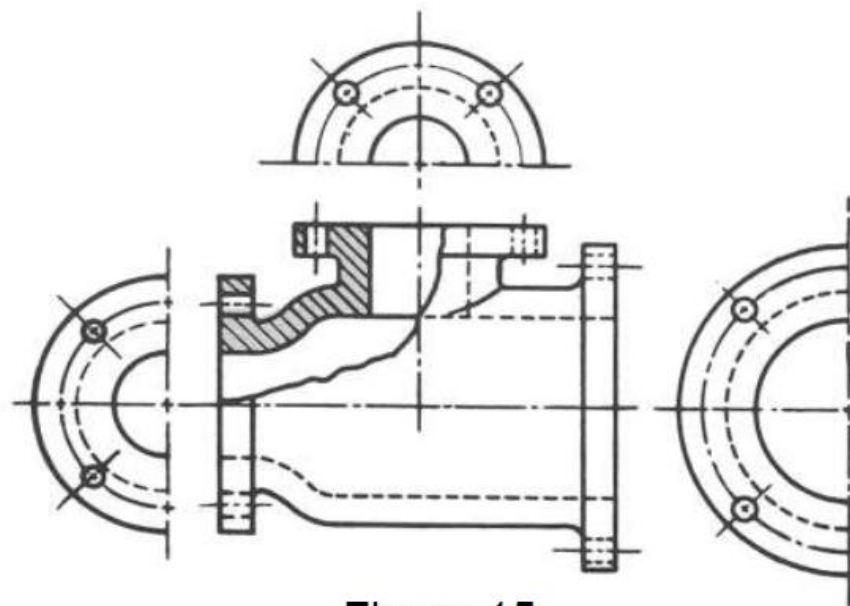


Figure 15

Rotated Section

- Some parts of an object have to be rotated to show the section.
- The cutting plane is passed **perpendicular to the axis** of the part to be cut.
- The cut portion is **revolved 90°** and drawn in this position (i.e. **turning the section until it is parallel with the plane of projection**).
- The resulting view is a rotated section.

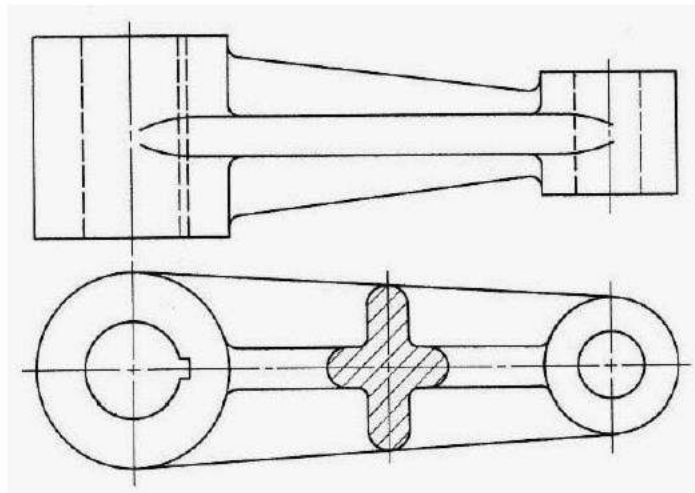


Figure 16

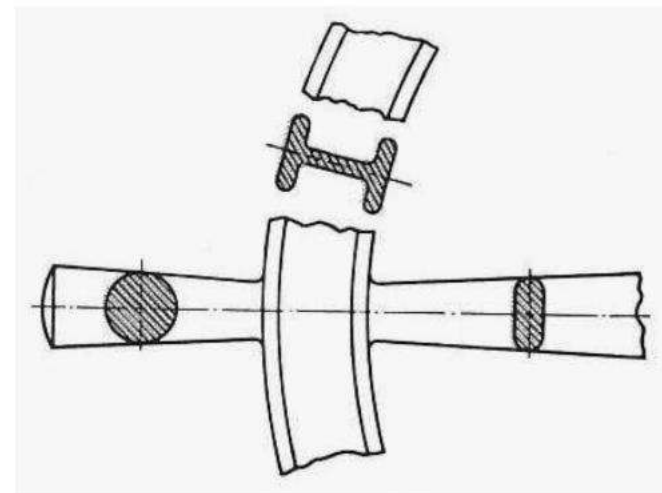


Figure 17

Removed Section

- This type of section is a revolved section **drawn outside of the normal view**.
- They are used if there is **restricted space for section** or **dimensioning prevents the use of an ordinary rotated section**.
- Several sections may be required when **shape of the part is not uniform**.
- These sections are **represented by a series of cutting planes and identifying letters** (e.g. Section A-A, B-B, C-C and so on).

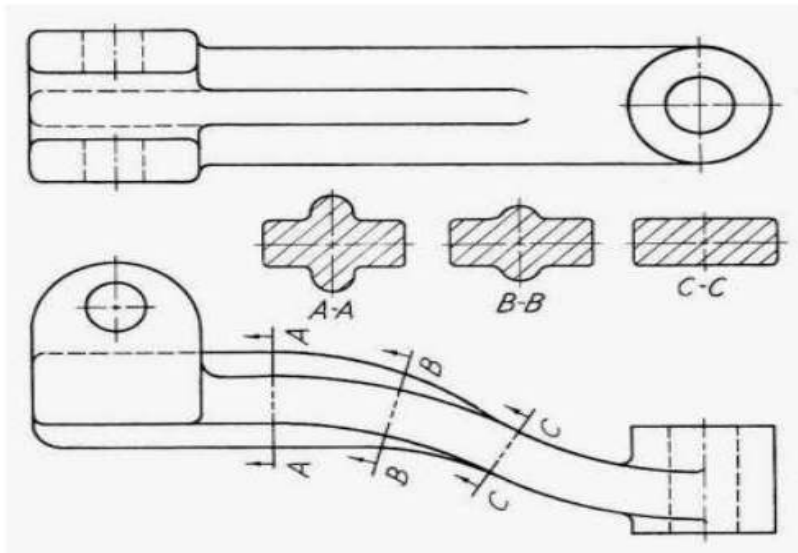


Figure 18

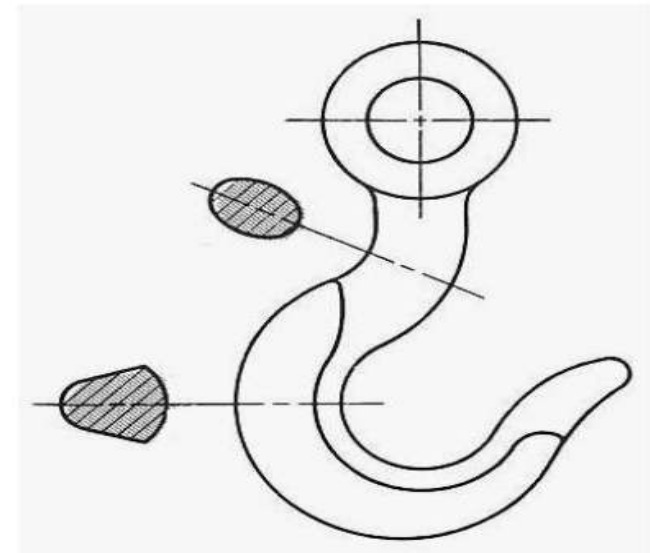


Figure 19

Cutting Plane Lines

- The cutting plane line is **an imaginary plane** passing through an object at the place where a section is to be made.
- This imaginary line is identified with **reference letters along with arrows** to show the direction in which the sectional view is taken.
- The beginning and end styles of cutting plane lines are **made bold**. This is also done at the portions where the cutting plane is offset (**Fig. 29**).

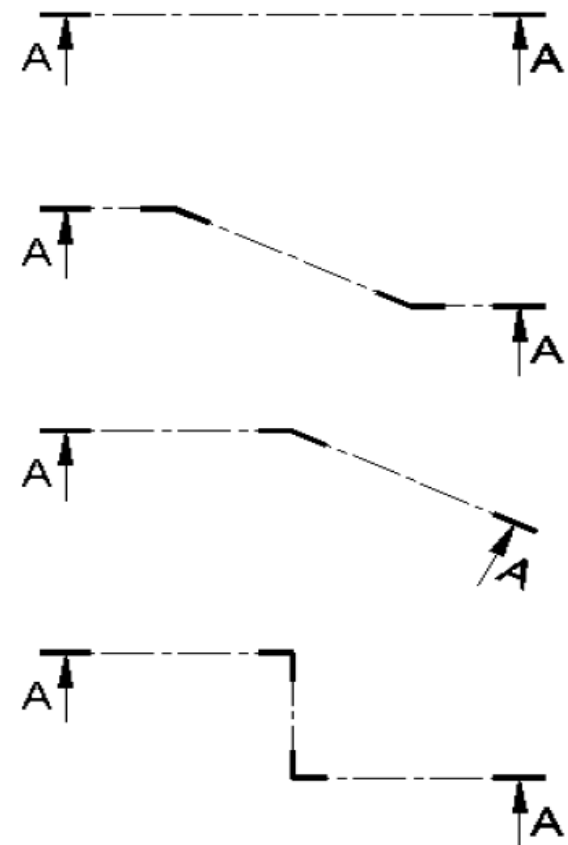
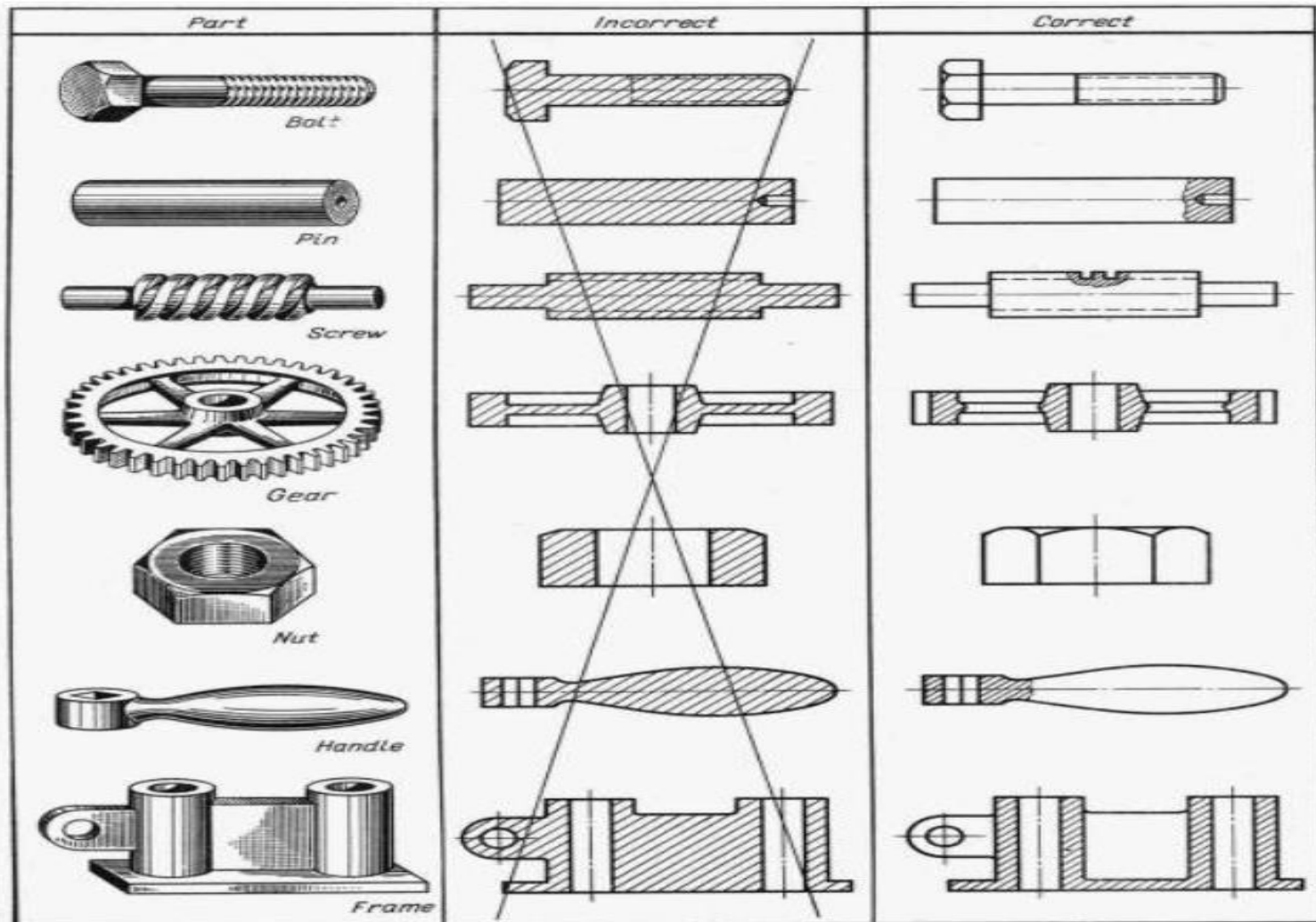


Figure 29

Various Conventions in Sectioning



Visible Edges in Section

- A section-lined area is **always completely bounded by a visible outline**, never by a hidden line or edge.
- Therefore, all visible edges and contours behind the cutting plane must be shown in sectional view (**Fig. 25b**).
- Otherwise, a section will appear to be made up of disconnected and unrelated parts (as in the case of **Fig. 25a**).

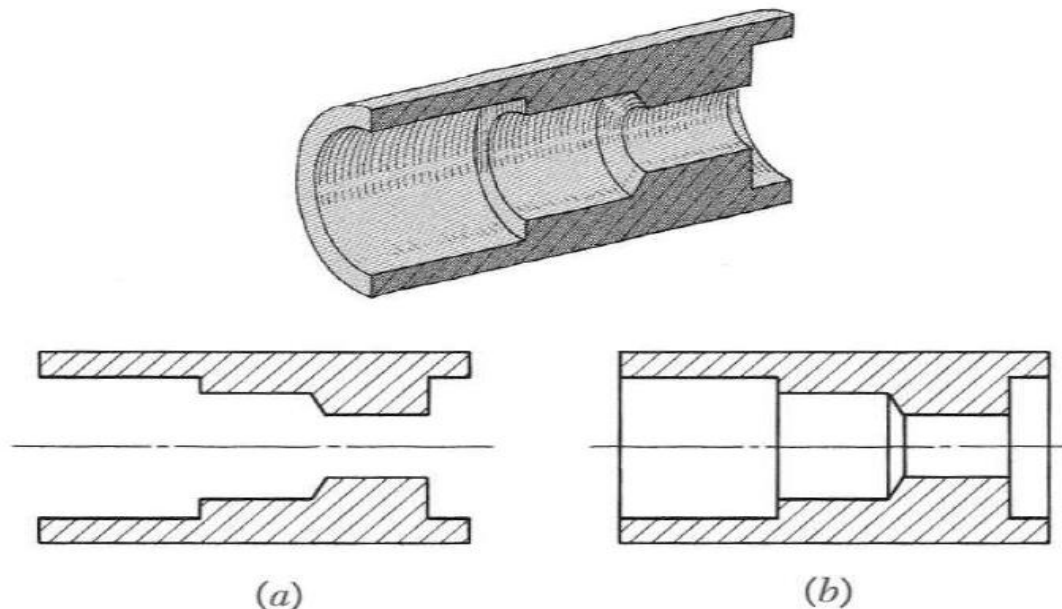


Figure 25

Examples:



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