Section Views

Introduction

In engineering industries, when the internal structure of an object is complicated, it is very difficult to visualize the object from its orthographic views since there will be several hidden lines. In such case, the internal details are shown by sectional views. Sectional views are an important aspect of design and documentation since it is used to improve clarity and reveal interior features of parts.

Sectional drawings are multi-view technical drawings that contain special views of a part or parts, that reveal interior features. A primary reason for creating a section view is the elimination of hidden lines, so that a drawing can be more easily understood or visualized. Traditional section views are based on the use of an imaginary cutting plane that cuts through the object to reveal interior features. This imaginary cutting plane is controlled by the designer and are generally represented by any of the following:

(a) Full section view, where the section plane go completely through the object. Example shown in figure 1.

(b) Half section view, where the section plane go half-way through the object. Example shown in figure 2.

(c) Offset section, where the sectional plane bent through the features that are not aligned. Example shown in figure 3.

(d) Broken-out section where the section go through part of the object . Example shown in figure 4.

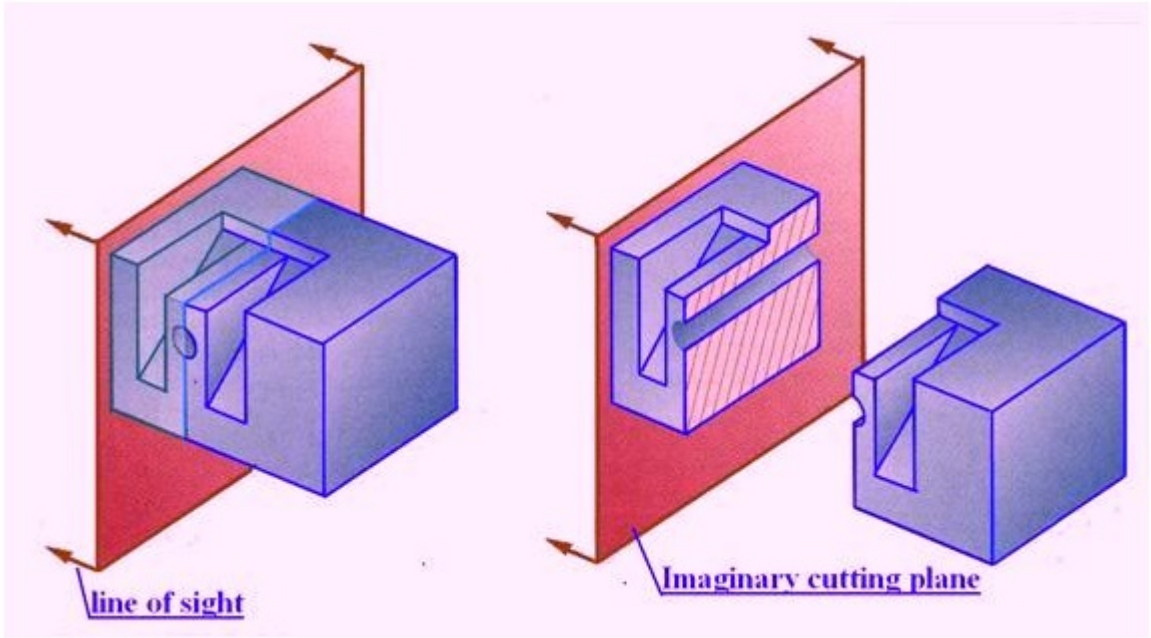

Figure 1. Illustrates a full Section view

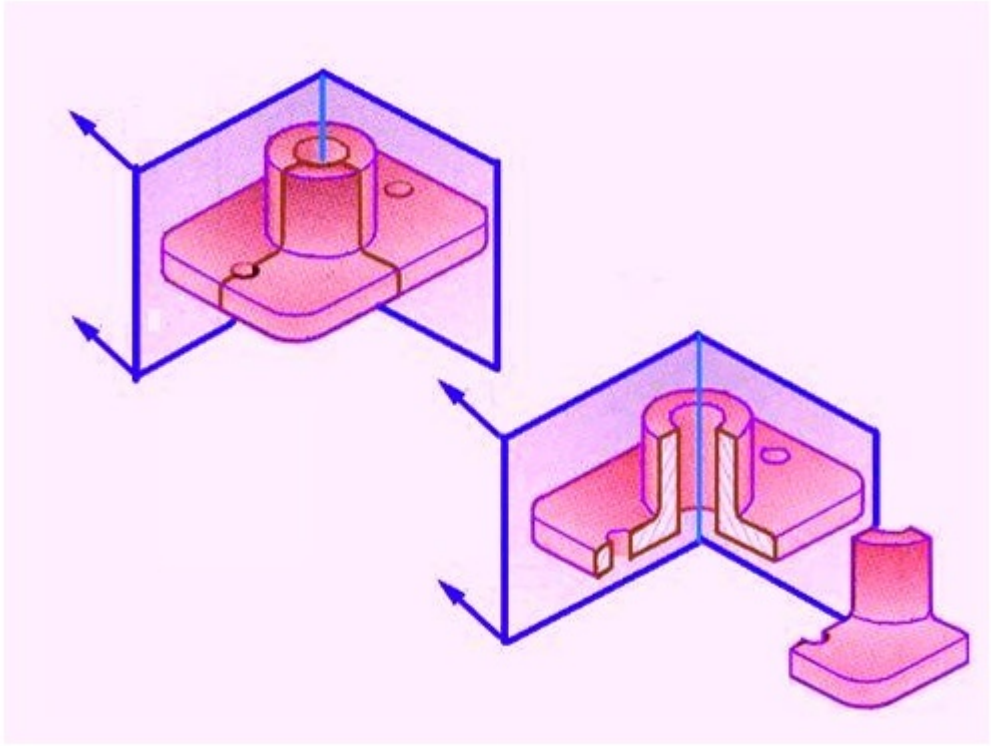

Figure 2. Illustrating a half section view

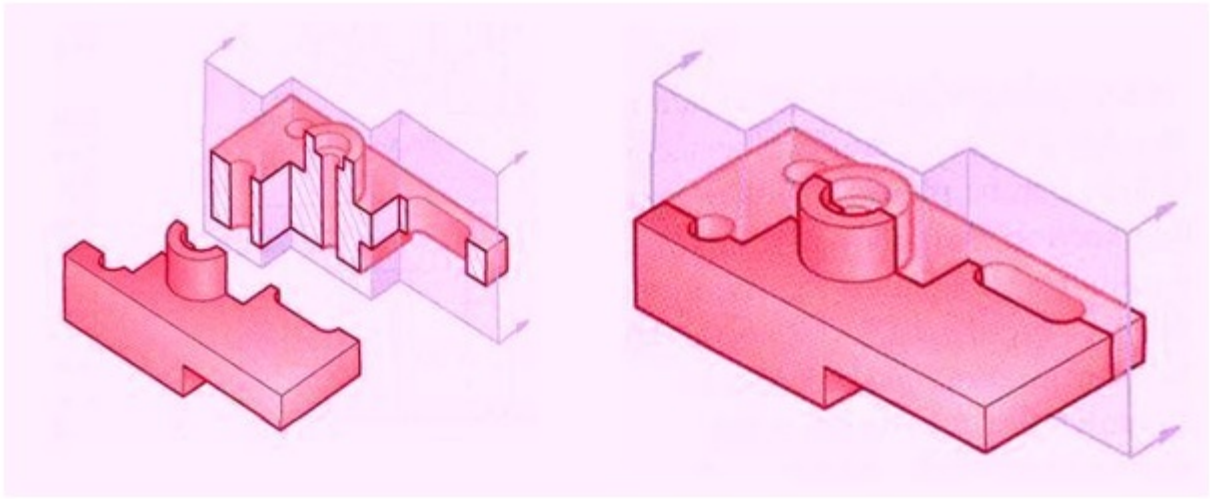

Figure 3. Illustrating an offset section

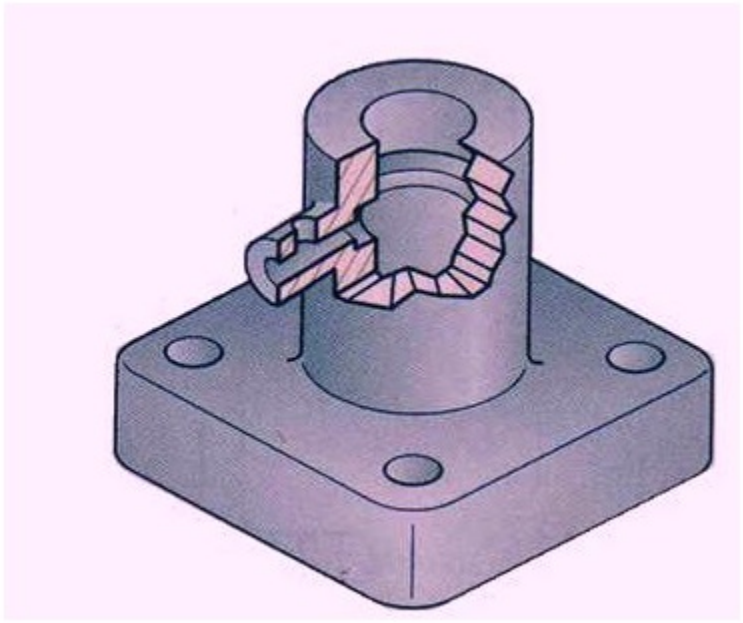

Figure 4. Illustrating a Broken-out Section

Visualization of Section Views

Figure 7 is multi-view drawing of a part that may be difficult to visualize in its 3-D form, because of the many hidden lines.

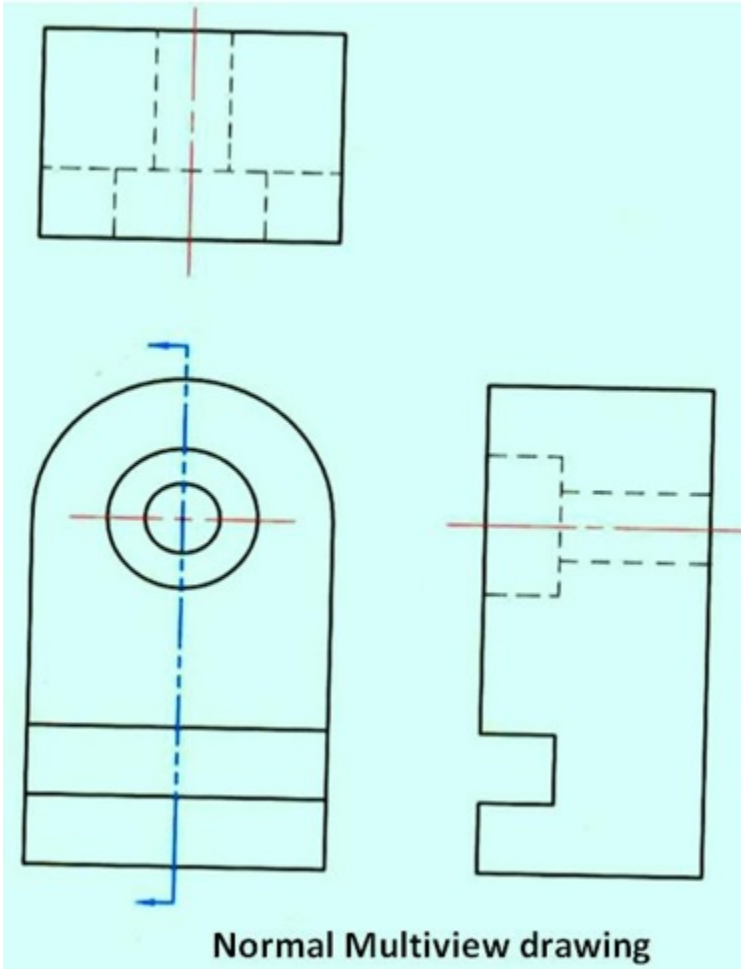

Figure 7 A multiview drawing of an object

A section view is created by passing an imaginary cutting plane vertically through the center of the part. Figure 8 is a 3D representation of the part after it is sectioned. The section view more clearly shows the interior features of the part. In the left corner of the figure, the cutting plane arrows, in the front view, point to the left, to represent the direction of sight for producing a right side view in full section. The direction of the arrow can also be thought of as pointing toward the half of the object being kept. The right half of the object is "removed" to reveal the interior features of the part. The line of sight for the section view is perpendicular to the cut surfaces, which means they are drawn true size and shape in the section view. Also, no hidden lines are drawn and all visible surfaces and edges behind the cutting plane are drawn as object lines. The corners of the section view are numbered as shown in the right hand figure so that they can be compared with the orthographic section view.

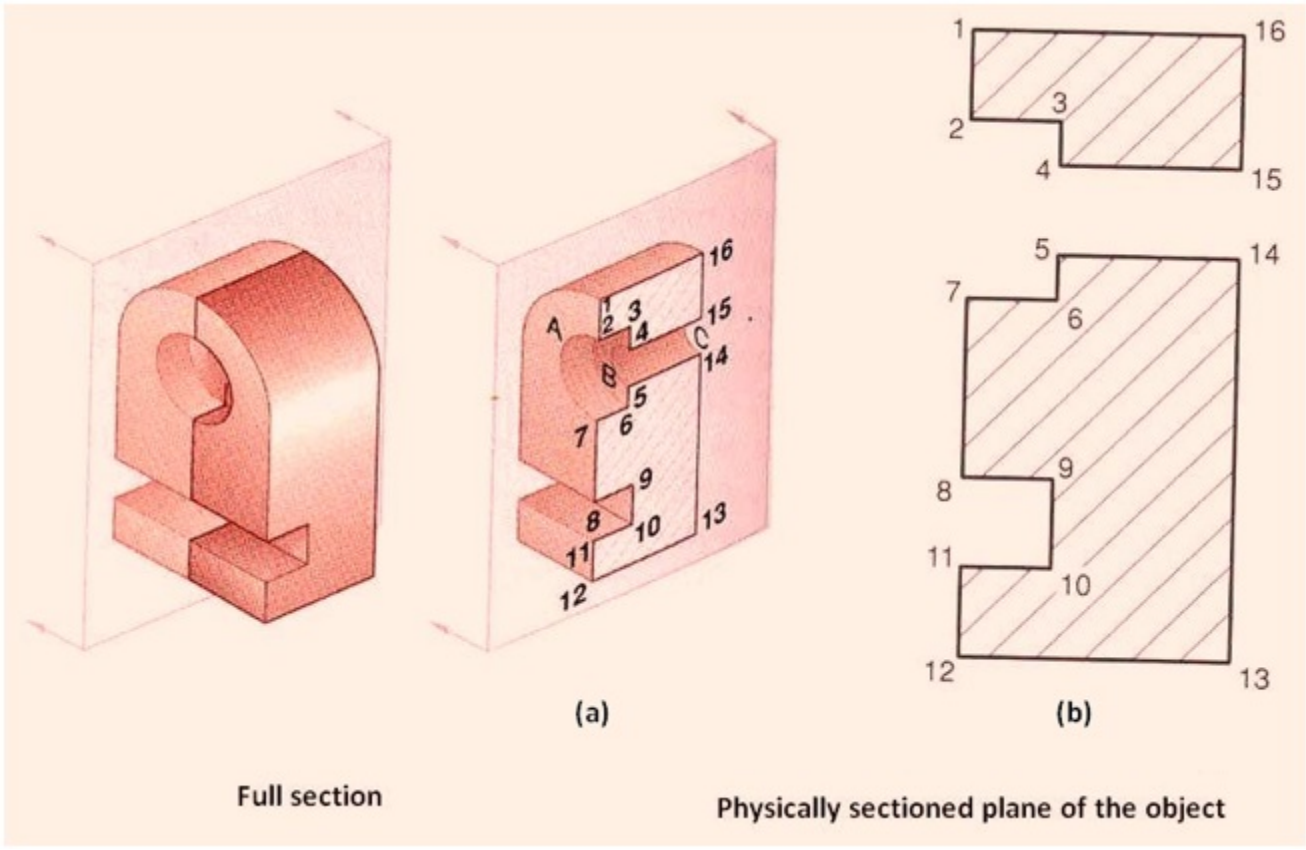

Figure 9 showing a full section and the physically sectioned plane of the object

The representation of the section view of the object shown in figure 9 is shown as (b) in figure 10. The section view in figure (a) shows only those surfaces touched by the cutting plane. Since conventional practice requires that features behind the cutting plane be represented, the change of planes between the two holes in the counter bored hole are shown in figure (b). If the section is viewed along the line of sight identified by the arrows in figure (c), arcs A, B, and C will be visible and should be represented as lines. In figure (b), the lines are 2-7,4-5,15-14. The counter bore and through holes are represented as rectangular features 2-7-6-3, and 4-5-14-15. All the surfaces touched by the cutting plane are marked with section lines. Because all the surfaces are the same part, the section lines are identical and are drawn in the same direction. The center line is added to the counter bored hole to complete the section view.

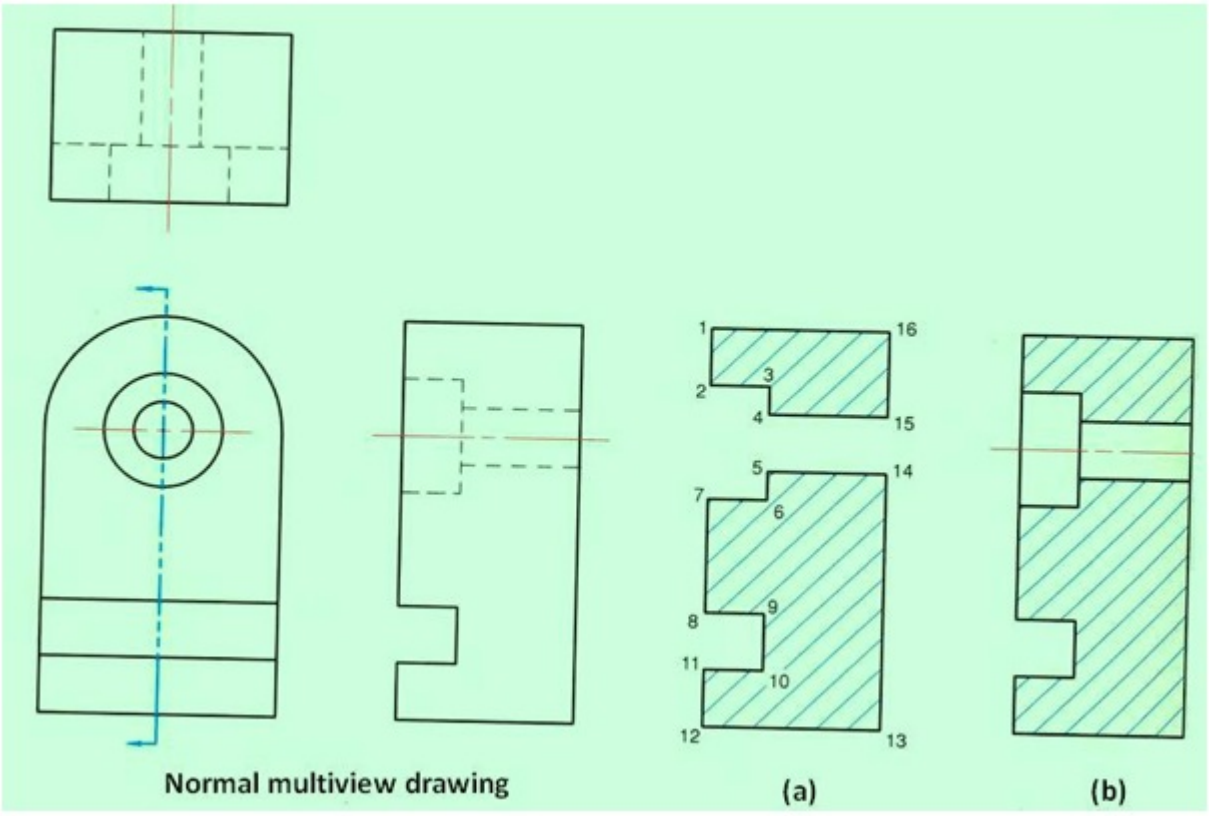

Figure 10. showing the object, orthographic view, sectioned surface and sectional view.

CUTTING PLANE LINES: The cutting plane line show the exact line along which the cutting plane passes through the object. This represent the edge view of the cutting plane and are drawn in the view(s) adjacent to the section view. This is represented in figure 11. In the figure the cutting plane line is drawn in the top view, which is adjacent to the sectioned front view.

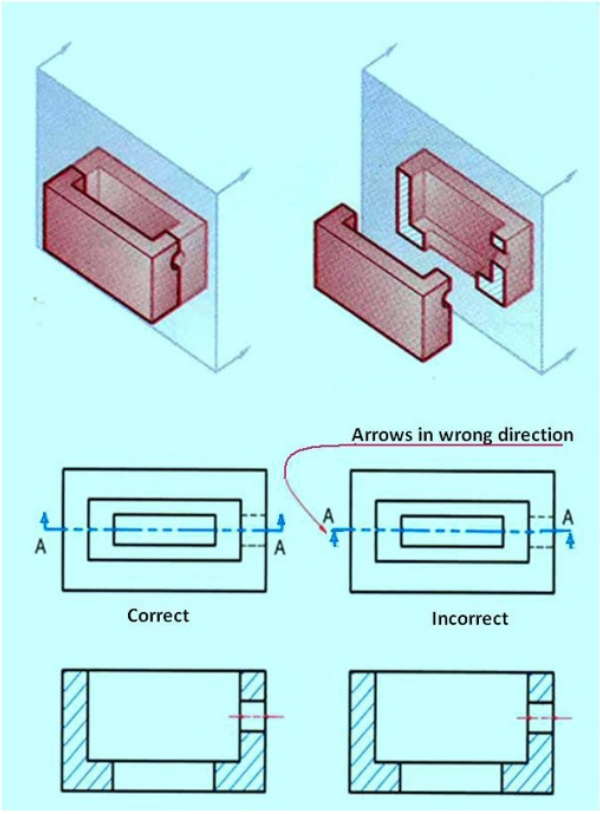

Figure 11 showing the representation of a cutting plane line

Material Symbols

The type of section line used to represent a surface varies according to the type of material. Symbols generally used for various materials are shown in figure 15. However, the general purpose section line symbol used in most section view drawings is that of cast iron. The specific type of steel to be used will be indicated in the title block or parts list. Occasionally, with assembly section views, material symbols are used to identify different parts of the assembly.

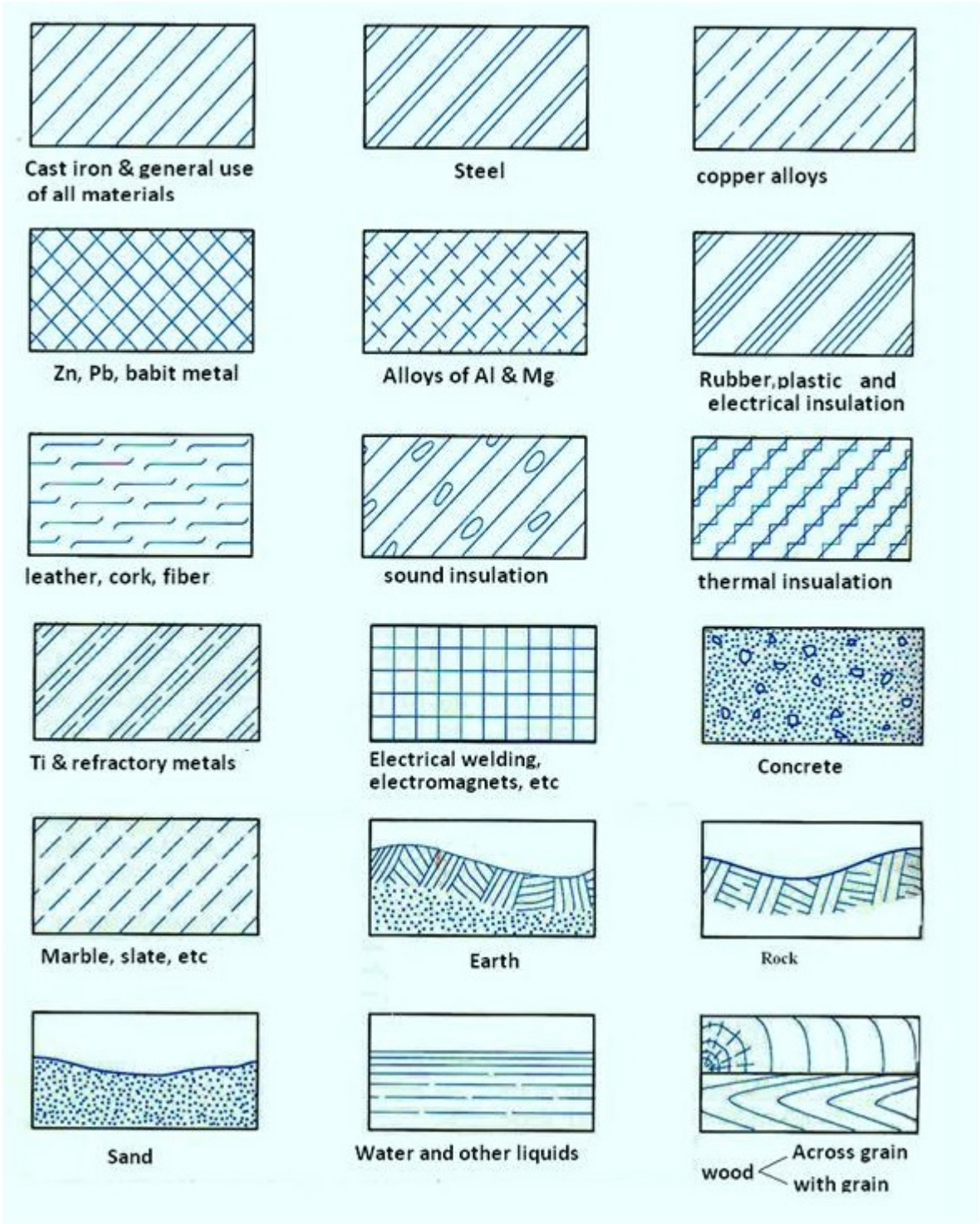

Figure 15. General symbols used to represent various materials in section view.