

**ENGG110-04 – Engineering Graphics
Spring 2004**

Handout #3

SECTION VIEWS

1- INTRODUCTION

The technique called section views is used to improve the visualization of new designs, clarify multiview drawings, and facilitate the dimensioning of drawings. For example, orthographic drawings of complicated mechanical parts can be very difficult to visualize and dimension. Section views can be used to reveal interior features of an object that are not easily represented using hidden lines. Architectural drawings use section views to reveal the interior details of walls, ceilings, and floors. Three-dimensional geometric models created with CAD can be sectioned to reveal interior features and assist in the design of complex systems.

2- SECTIONING BASICS

Section views use a technique that is based on passing an imaginary cutting plane through a part to reveal interior features. Creating section views requires visualization skills and adherence to strict standards and conventional practices. This tutorial will explain the theory for creating section views, the important conventional practices used for section views, and examples of standard practices.

An important reason for using section views is to reduce the number of hidden lines in a drawing (Figure 1). A section view reveals hidden features without the use of hidden lines. Adding hidden lines to a section view complicates the drawings, defeating the purpose of using a section. There are times, however, when a minimum number of hidden lines are needed to represent features other than the primary one shown by the section B-B in Figure 1.

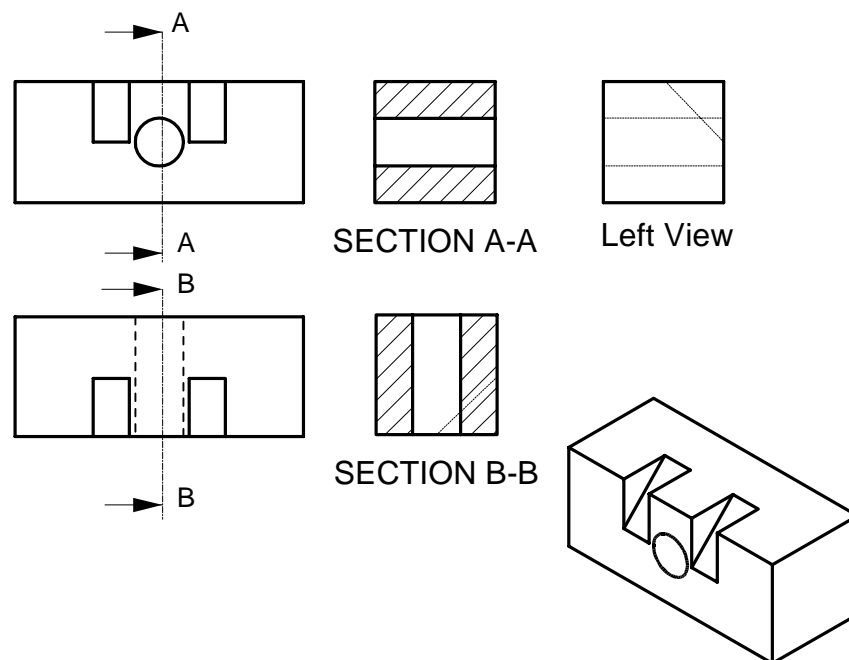


Figure 1

Visible surfaces and edges that represent a change of planes behind the cutting plane are drawn in a section view. For example, Figure 2 shows a section view for which the cutting plane passes through the center of a counterbored holes. A line represents the change of planes between the drilled and counterbored holes in an example of a visible feature that is behind the cutting plane

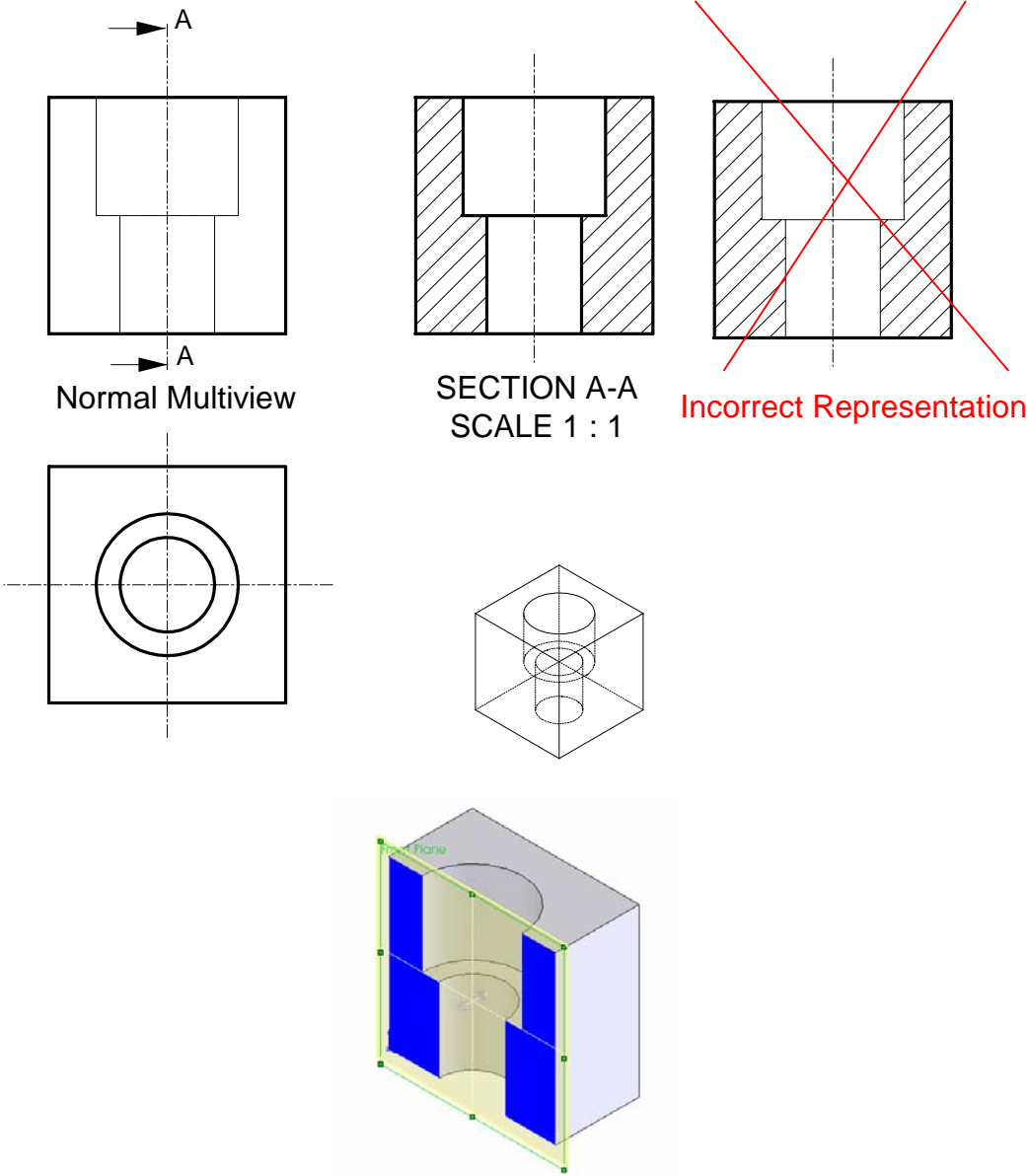


Figure 2

3- SECTION LINE PRACTICES

Section lines or cross-hatch lines are added to a section view to indicate the surfaces that are cut by the imaginary cutting planes. Different section line symbols can be used to represent various types of materials. However, there are so many different materials used in design that the general symbol maybe used for most purposes on technical drawings. The actual type of material required is then noted in the title block or parts list, or entered as a note on the drawing. The angle at which section lines are drawn is usually 45 degrees to the horizontal, but this can be change for adjacent parts shown in the same section. Also, the spacing between section lines is uniform on a section view. (Figure 3)

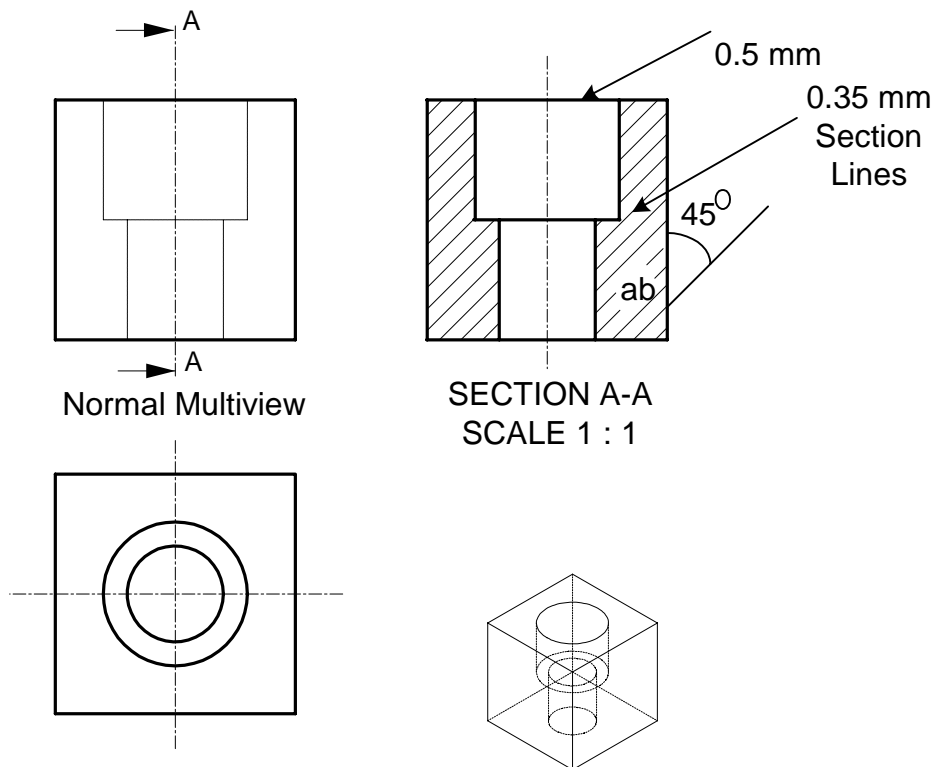


Figure 3

Section line is drawn at a 45-degree angle and spaced 1.5 mm to 3 mm or more depending on the size of the drawing. As a general rule, use 3 mm spacing. Section lines are drawn as thin (0.35 mm) black lines, usign an H or 2H pencil.

Avoid placing dimensions and notes within the section lined areas. If the dimension or note must be placed within the section area, omit the section lines in the area of the note.

4- SECTION VIEW TYPES

There are many types of section views used on technical drawings.

1. Full section
2. Half section
3. Broken-out section
4. Revolved section
5. Offset section
6. Removed section

4.1. Full section

A full section view is made by passing the imaginary cutting plane completely through the object, as shown in Figure 4.1. All the hidden features intersected by the cutting plane are represented by visible lines in the section view. Surfaces touched by the cutting plane have section lines drawn at a 45-degree angle to the horizontal. Hidden lines are omitted in all section views unless they must be used to provide a clear understanding of the object.

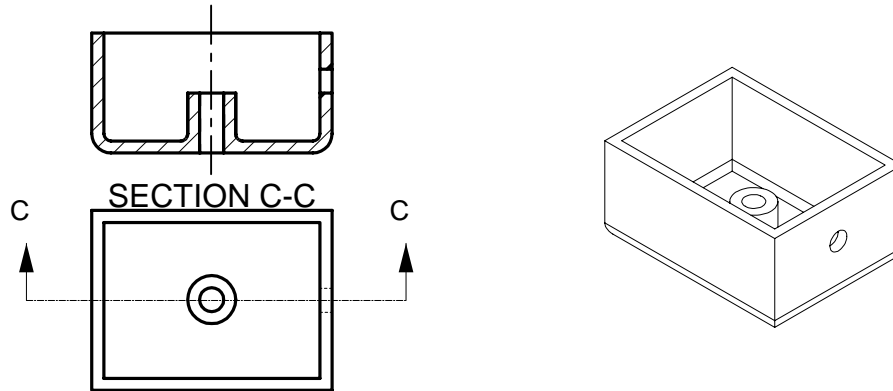


Figure 4.1.

4.2. Half section

Half sections are created by passing an imaginary cutting plane only halfway through an object (Figure 4.2). The cutting plane passing halfway through an object and one quarter of the object being removed.

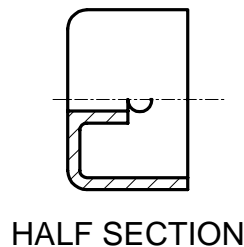


Figure 4.2.

4.3. Broken-out section

A broken-out section is used when only a portion of the object needs to be sectioned. Figure 4.3 shows a part with a portion removed or broken away. A broken-out section is used instead of a half or full section view to save time.

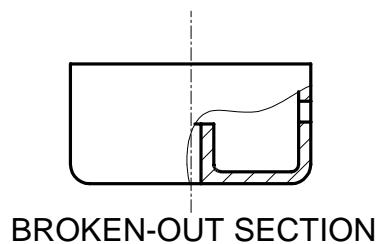


Figure 4.3.

4.4. Offset section

An offset section has a cutting plane that is bent at one or more 90-degree angles to pass through important features (Figure 4.4). Offset sections are used for complex parts that have a number of important features that cannot be sectioned using a straight cutting plane.

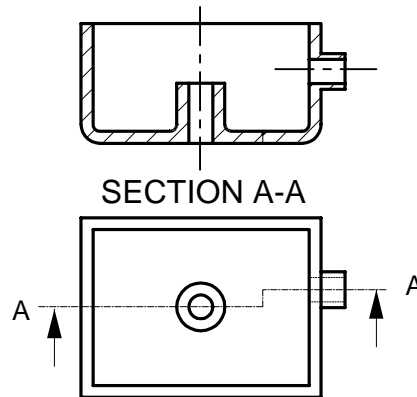


Figure 4.4.

4.5. Revolved section

A revolved section view is created by passing a cutting plane through the object, then revolving the cross section 90 degrees (Figure 4.5).

A revolved section is used to represent the cross section of a bar, handle, spoke, web, aircraft wing, or other elongate feature. Revolved sections are useful for describing a cross section without having to draw another view. In addition, these sections are especially helpful when a cross section varies or the shape of the part is not apparent from given orthographic views.

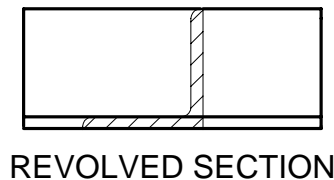


Figure 4.5.

4.6. Removed section

A removed section views do not follow standard view alignments as practiced in multiview drawings. Removed sections are made in a manner similar to removed sections, by passing an imaginary cutting plane perpendicular to a part then revolving the cross section 90 degrees. However, the cross section is then drawn adjacent to the orthographic view, not on it. (Figure 4.6).

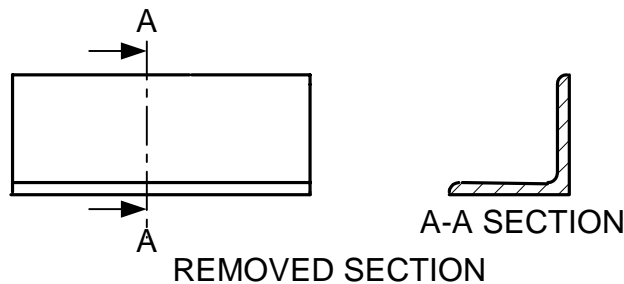


Figure 4.6.