Section Views
The technique called section views is used to improve the visualization of new designs, clarify multiview drawings and facilitate the dimensioning of drawings. For mechanical drawings section views are used to reveal interior features of an object that are not easily represented using hidden lines.
Section Views

- **Sectional drawings** are multiview technical drawings that contain special views of a part or parts, a view that *reveal interior features*. In the figure a regular multiview drawing and a sectioned multiview drawing of the same part in the front view, the hidden features can be seen after sectioning.

- Traditional sections views are based on the use of an imaginary **cutting plane** that cuts through the object to reveal interior features.
Section Views
Change of plane behind the cutting plane represented as a line.

(A) Correct representation  
(B) Incorrect representation  
(C) Normal multiview
Visualization
Section Views

Cutting Plane Lines

Arrows in wrong direction arrows should show the line of sight necessary for section view.

Correct cutting plane line

Incorrect cutting plane line
(A) Cast or malleable iron and general use for all materials

(B) Steel

(C) Bronze, brass, copper and compositions

(D) White metal, zinc, lead, babbitt, and alloys

(E) Magnesium, aluminum, and aluminum alloys

(F) Rubber, plastic, and electrical insulation

(G) Cork, felt, leather and fiber

(H) Sound insulation

(I) Thermal insulation

(J) Titanium and refractory material

(K) Electric windings, electromagnets, resistance, etc.

(L) Concrete

(M) Marble, slate, glass, porcelain, etc.

(N) Earth

(O) Rock

(P) Sand

(Q) Water and other liquids

(R) Powder, grain
Section Views Types

Full Section

A **full section** view is made by passing an imaginary cutting plane fully through an object. The figure shows an imaginary cutting plane passing fully through an object and half of it being removed. In a multiview drawing, a full section view is placed in the same position that an unsectioned view would normally occupy; that is, a front section view would replace the traditional front view.
Section Views Types

- **Half section**
  - **Half sections** are created by passing an imaginary cutting plane halfway through an object and one quarter of it is removed. Hidden lines are omitted on both halves of the section view. External features of the part are drawn on the unsectioned half of the view. A center line, not an object line, is used to separate the sectioned half from the unsectioned half of the view. Half section views are most often used on parts that are symmetrical, such as cylinders.
(A) Half section

(B) Multiview

(C) Half section view
Section Views Types

- Broken-out section
  
  A **broken-out section** is used to show interior features of a part by breaking away some of the object. A broken-out section is used instead of a half or full section view to save time. A break line separates the sectioned from un-sectioned half of the view. A break line is drawn free-hand to represent the jagged edge of the break. No cutting plane line is drawn with a broken-out section view.
Section Views Types

- Revolved section

  A revolved section is made by revolving the cross-section view of the part about an axis of revolution and placing the section view on the part. The cross section created at the position that the cutting plane passed is then revolved 90 degrees and drawn on the view. Visible lines adjacent to the revolved view can either be drawn or broken out using conventional breaks.
Line of sight

Cutting plane

Revolved section

True size section

(A) Revolved section

(B) Revolved section; broken view
Section Views Types

- Removed section

  Removed sections are used to show the contours of complicated shapes such as wing and fuselage, blades for jet engines. Removed sections are made in a manner similar to revolved 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. If a number of removed sections are done on a part, cutting plane lines may be drawn with labels to clarify the position from which each section is taken. Whenever possible, a removed section should be on the same sheet as the part it represents, and it should be clearly labeled.
TWO CROWDED FOR REVOLVED SECTION

Floor technique

Good technique

REMOVED SECTION

SECTION A-A
Section Views Types

Offset Sections

An **offset section** has its cutting plane bent at 90 degree angles to pass through important features. Offset sections are used for complex parts that have a number of important features that cannot be sectioned using a straight cutting plane. The cutting plane is bent at 90 degrees to pass through the hole, then bent 90 degrees again to pass through the slot.
Section Views Types

- Assembly section
- Auxiliary section
Section Views Types

- Special Sectioning Convections
  - Ribs, Web and Thin features
Section Views Types

Special Sectioning Conventions

**Aligned sections** are special types of orthographic drawings used to revolve or align special features of parts to clarify or make them easier to represent in section. Normally the alignment is along a horizontal or vertical center line and always less than 90 degrees.
Spoke A omitted in the O preferred section view

True Projection

Preferred
Section Views Types

- Special Sectioning Convections
  - Conventional breaks
    - **Conventional breaks** are used in revolved section views or to shorten a view of an elongated part, such as the handle of a shovel or an axle of a vehicle.