ME 1110 – Engineering Practice 1

Engineering Drawing and Design - Lecture 4

Orthographic Views & Sectioning

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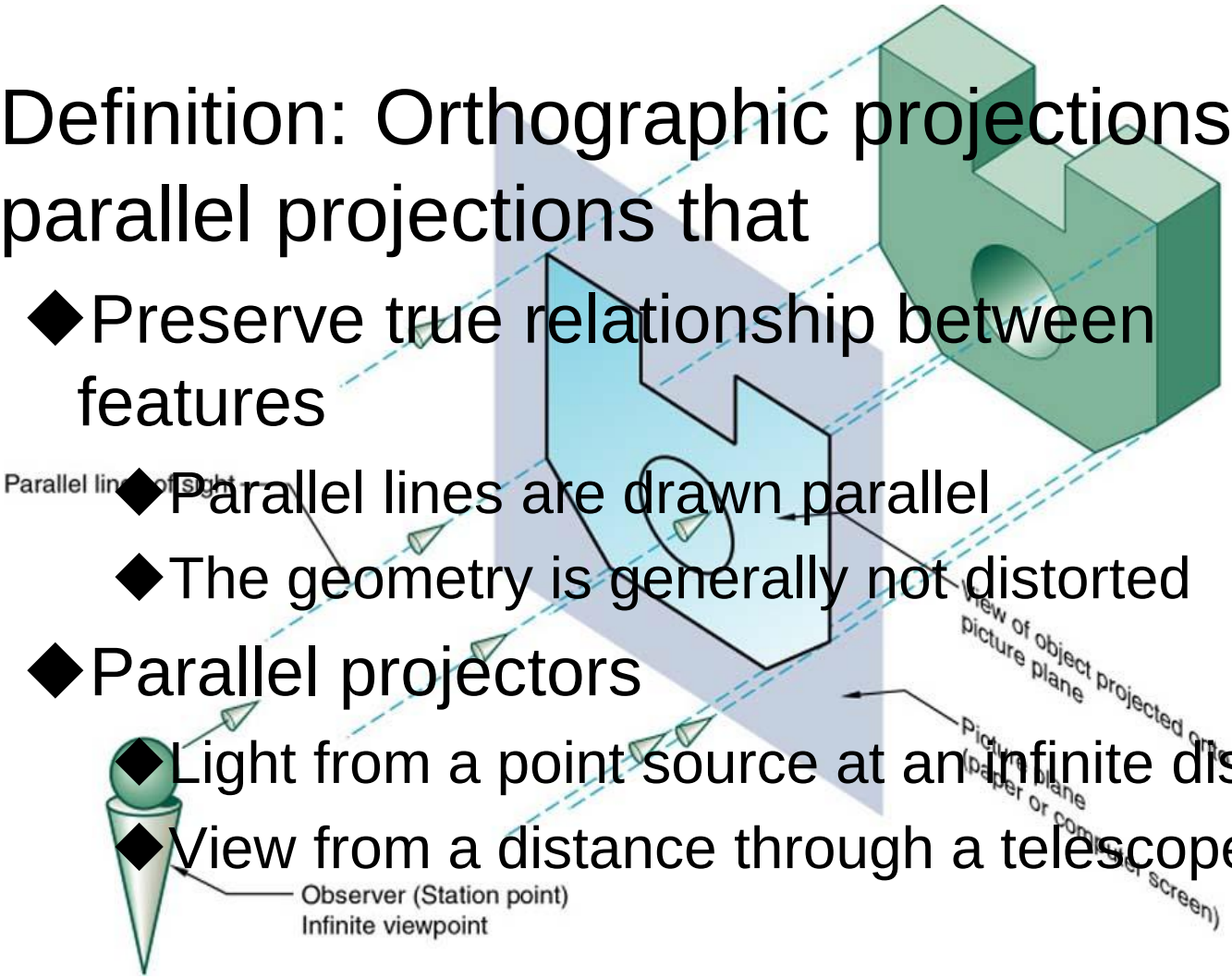
www.staff.city.ac.uk/~ra600/intro.htm

Objectives for today

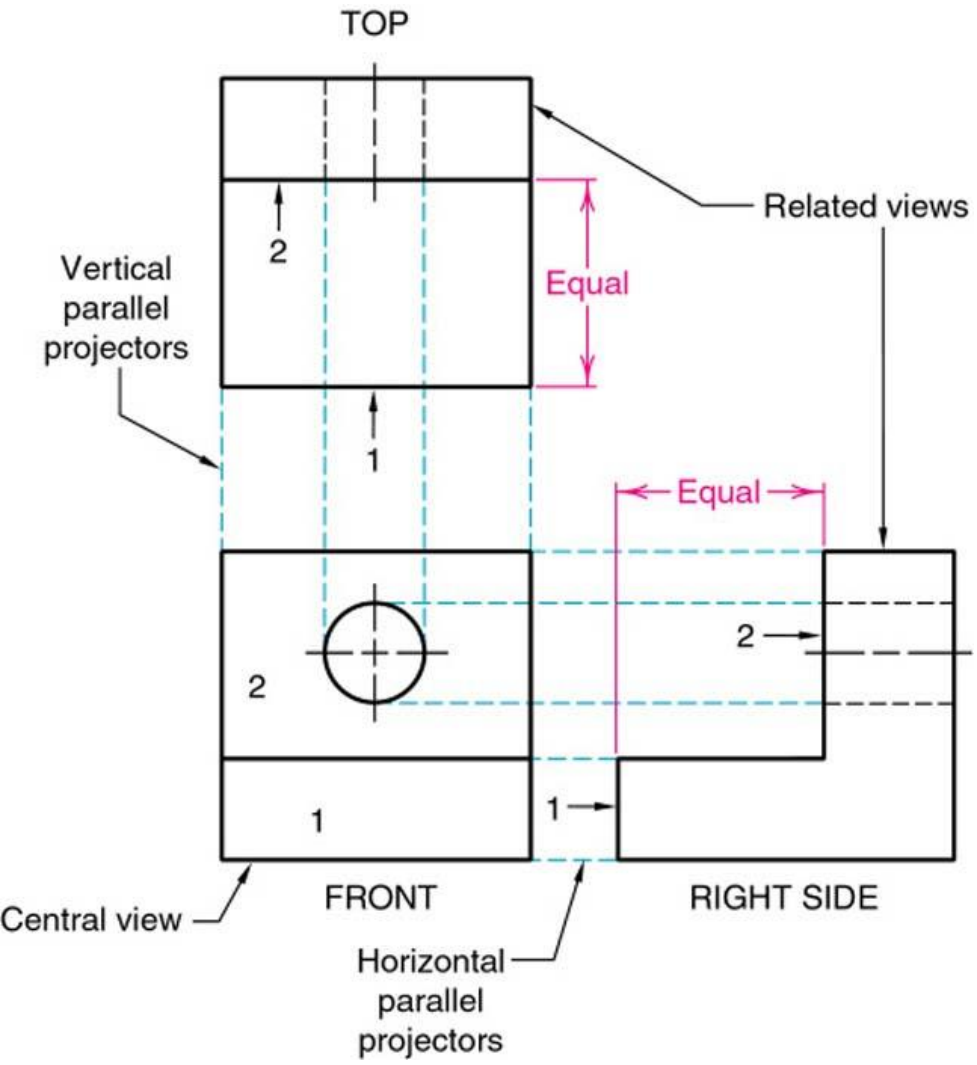
- Prepare for DrE-3
- Additional features in multiview drawings:
  - » Cutting plane, Section, hatching, hidden feature
- Section views and Section drawings
  - » Ribs, webs, assemblies, threads

Orthographic Projections

- Definition: Orthographic projections are parallel projections that
  - Preserve true relationship between features
    - Parallel lines are drawn parallel
    - The geometry is generally not distorted
  - Parallel projectors
    - Light from a point source at an infinite distance
    - View from a distance through a telescope



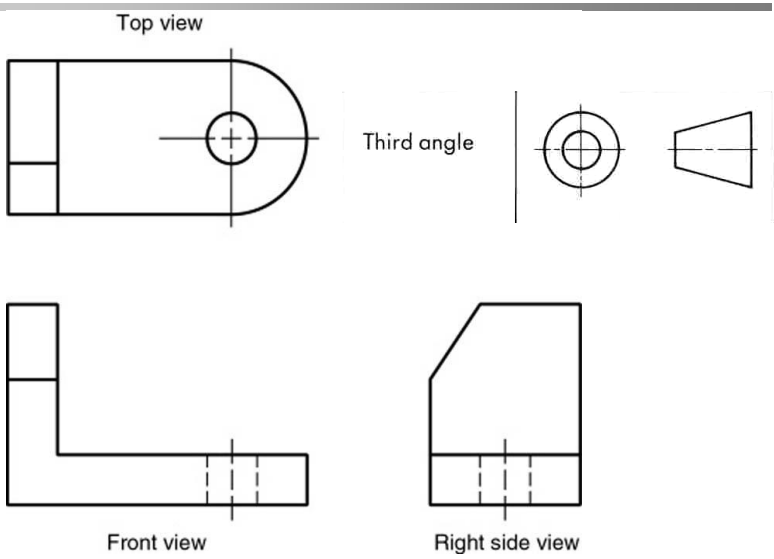
Orthographic Projection Properties



- Projection planes
  - Horizontal, frontal, and profile
  - Each projection plane is perpendicular to adjacent projection planes
- Views
  - top, front, and right side
  - Only use the views that are needed to represent the object
  - The most descriptive view should be the front view
  - Represented with dashed lines
  - Views should be selected to minimize the use of hidden lines

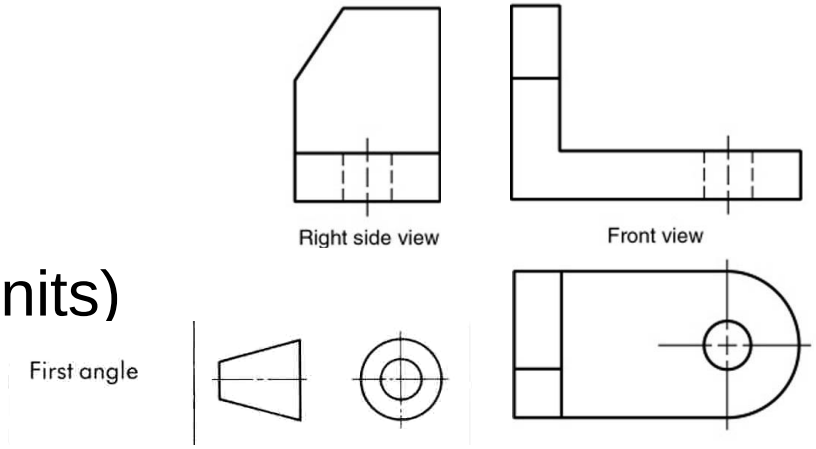
Angle projections

- Third Angle Projection
  - Associated with English units
  - If English units are used assume third angle projection unless otherwise specified
  - Include ANSI standard symbol

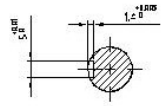


First Angle Projection

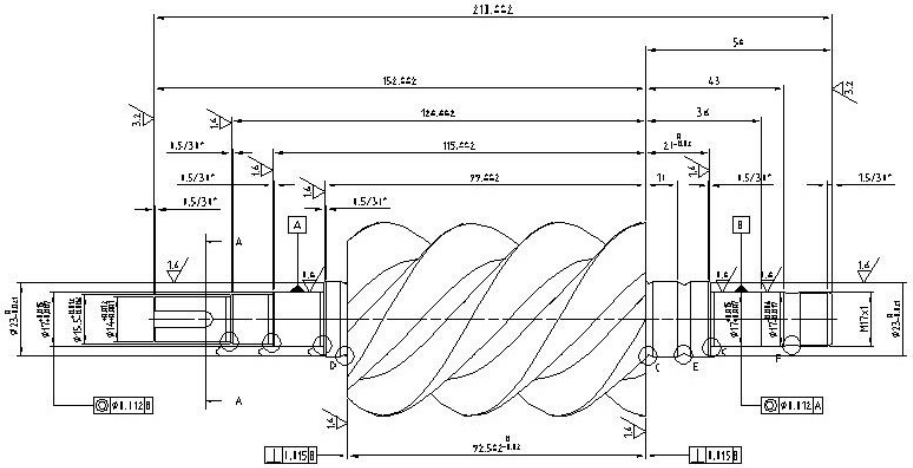
- Associated with SI units (International System of units)

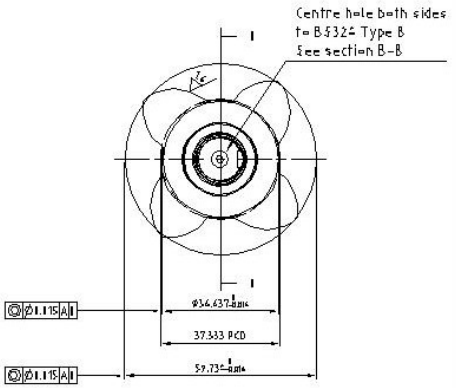


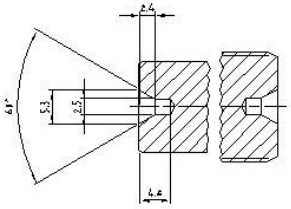
Detailed views



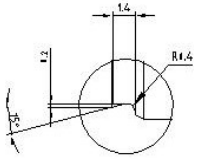
Section A-A



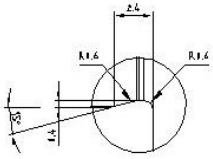




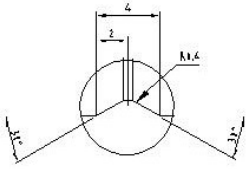
Section B-B (2:1)



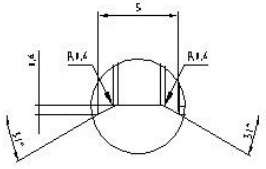
Detail C (5:1)



Detail D (5:1)



Detail E (5:1)



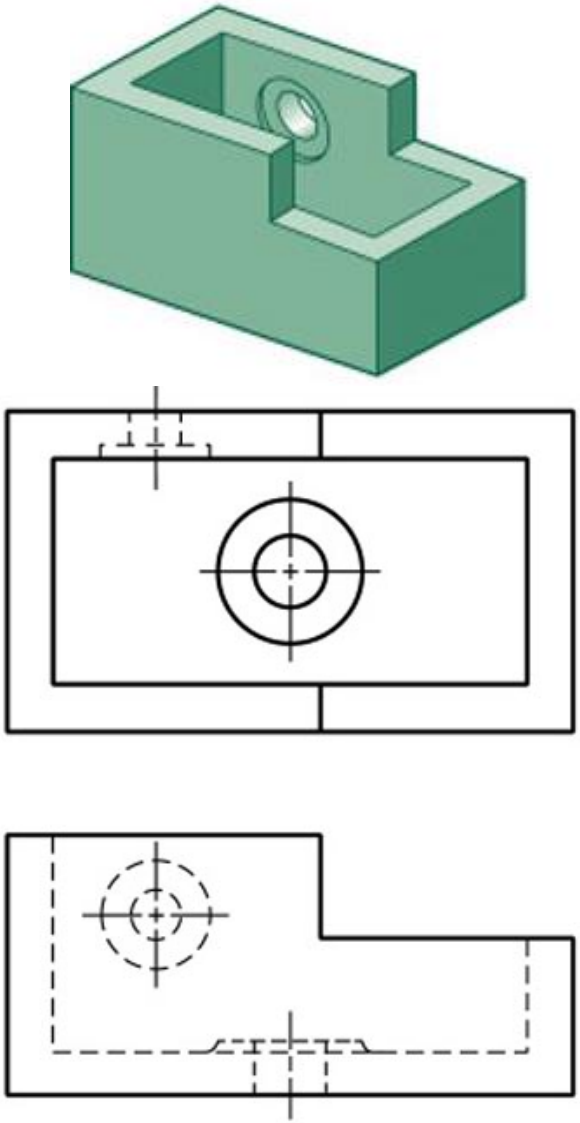
Detail F (5:1)

MODEL	VMC	CITY University	CENTRE FOR POSITIVE DISPLACEMENT COMPRESSOR TECHNOLOGY
MATERIAL	STEEL ANSI C-1141		
	NAME / DATE	MALE ROTOR	city_a2
DESIGNED	AK 02/04/03		
DRAWN	AK 02/04/03	DRAWING No. VMC_000	FILE NAME
CAD	02/04/03	SCALE 1:1	Drawing No. VMC_001
CHECKED	02/04/03		DRG.SHEET 1/1 REVISION
APPROVED	NS 02/04/03		

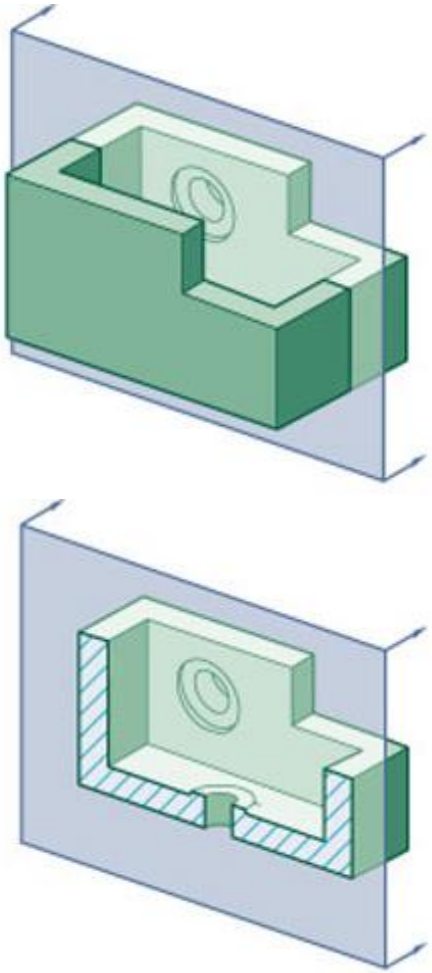
Sectioned Drawing

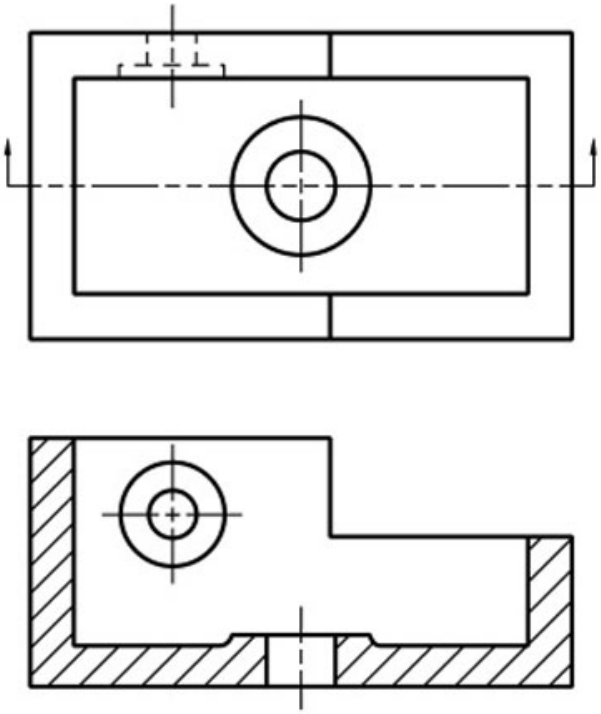
- Definition:
  - » A multiview technical drawing that reveals details about internal features by displaying the part as if cut by an imaginary cutting plane
- Objective:
  - » To make the drawing more understandable, especially the internal details of the part
- Principles:
  - » Since the sectioned drawing shows internal features there is generally no need to show hidden lines
  - » Helpful for both, detailed and assembly drawings

How to reveal hidden feature



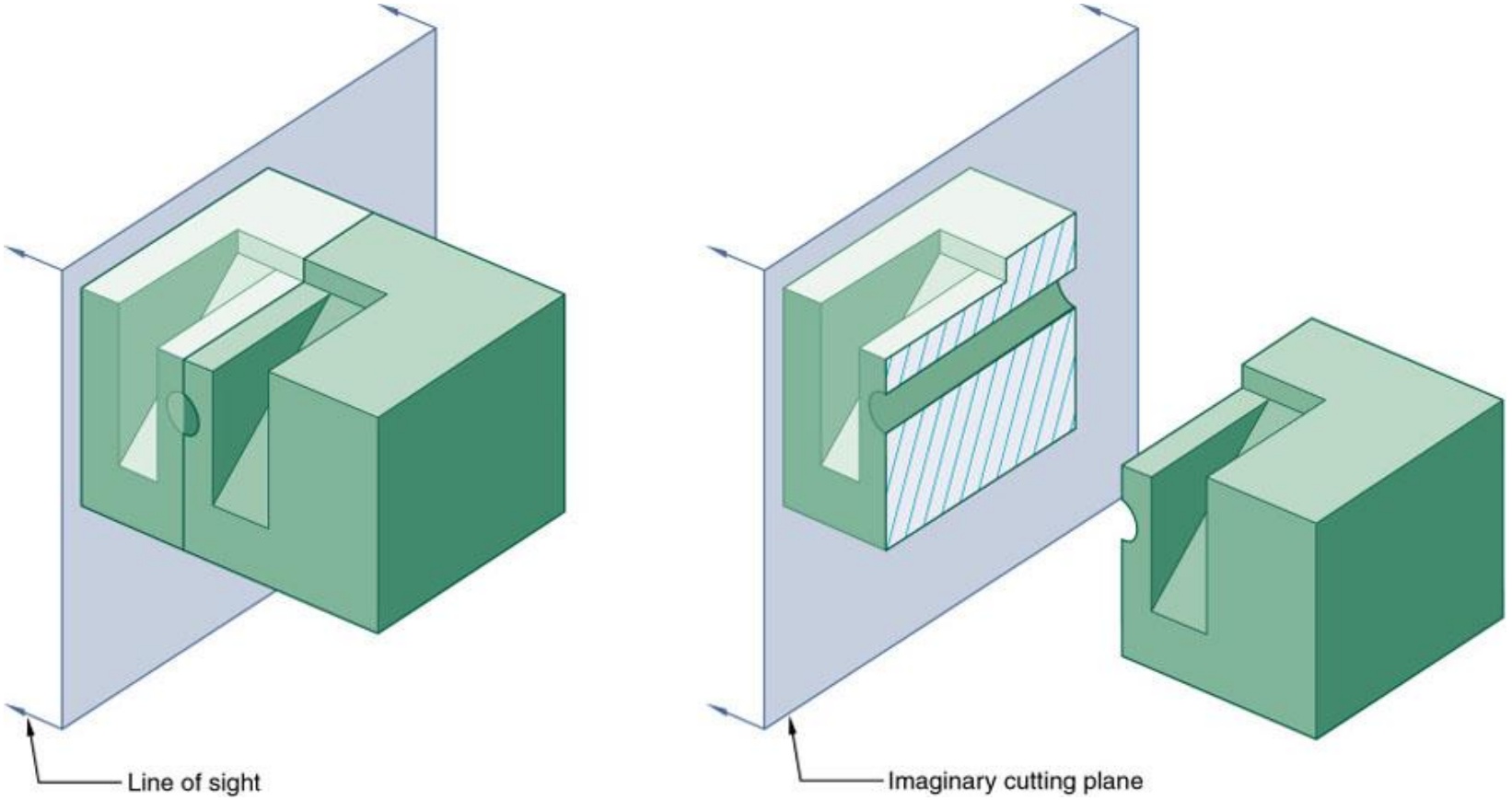
Normal multiview drawing



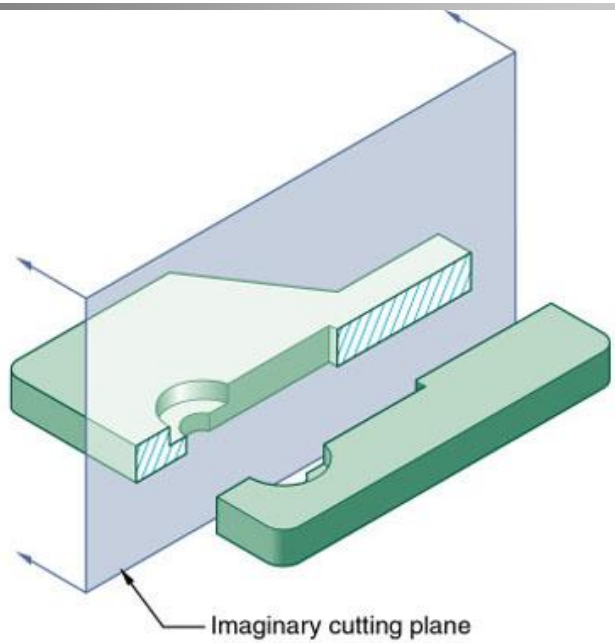


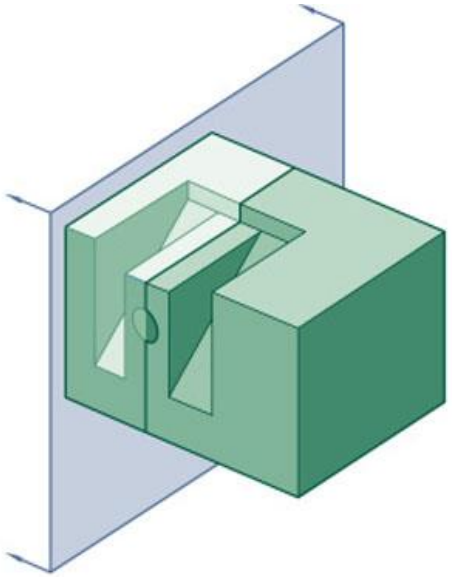
Section view drawing

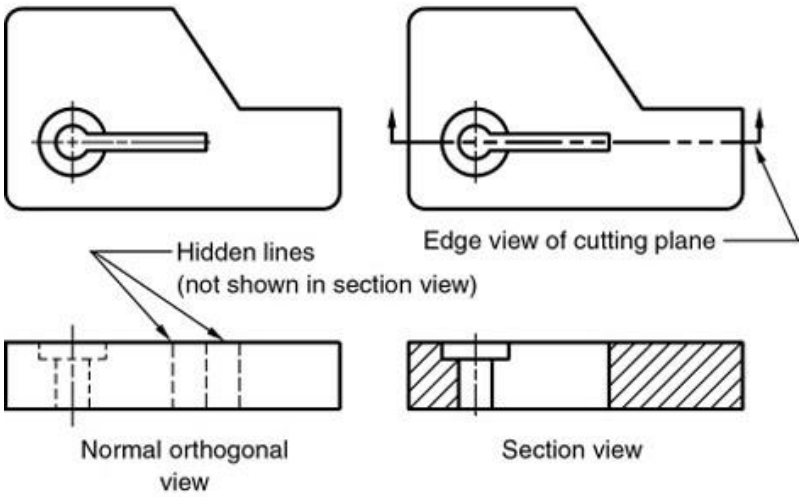
Cutting plane

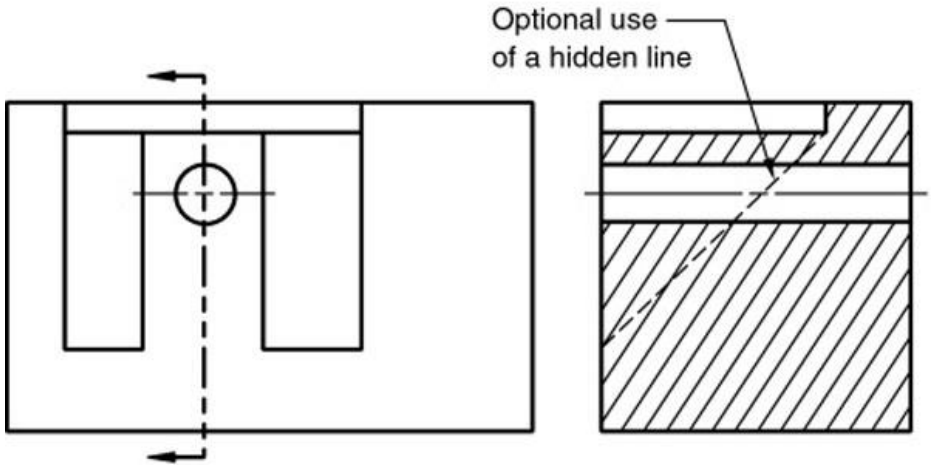


Hidden lines

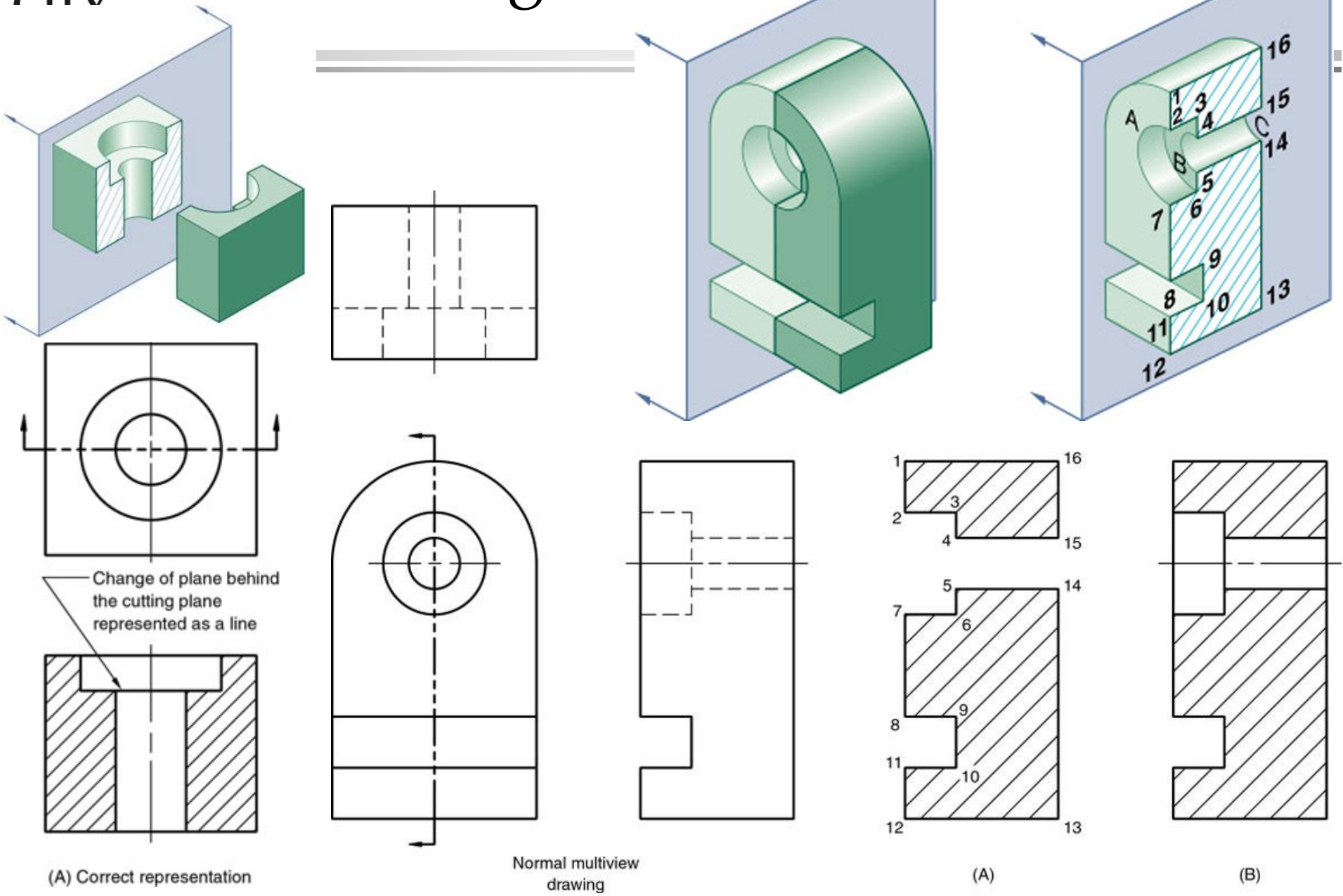




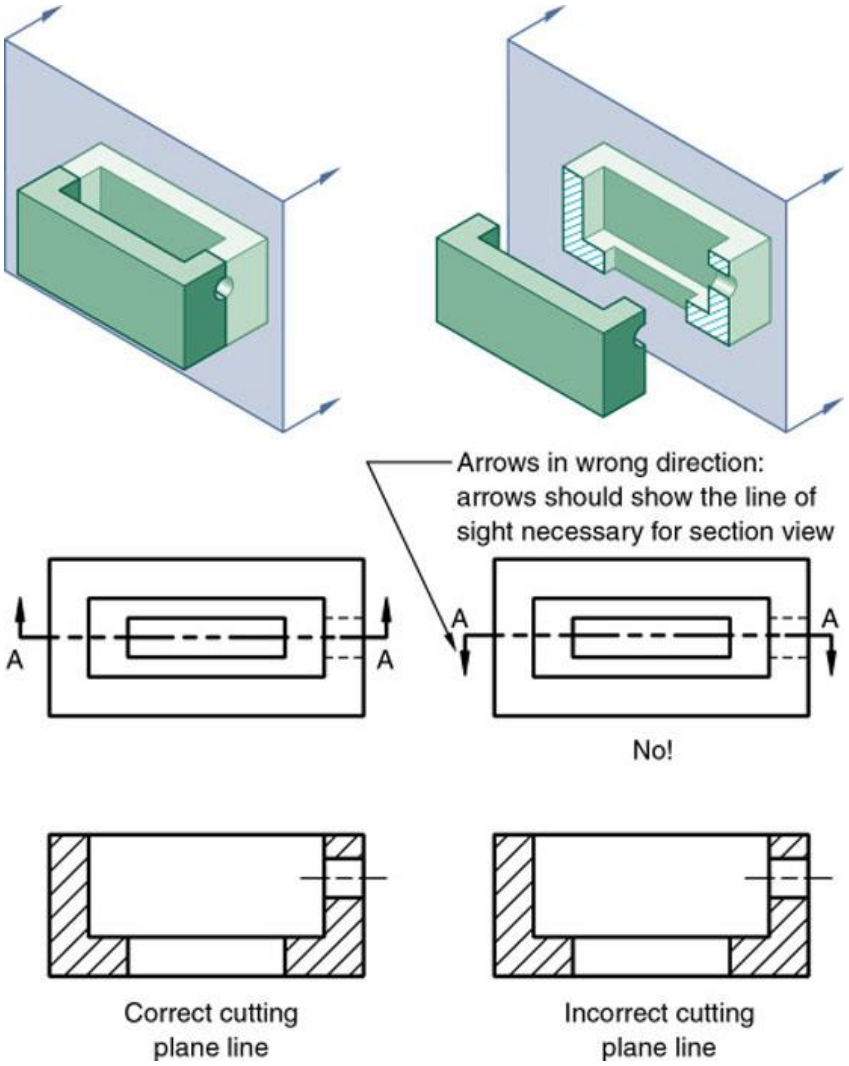




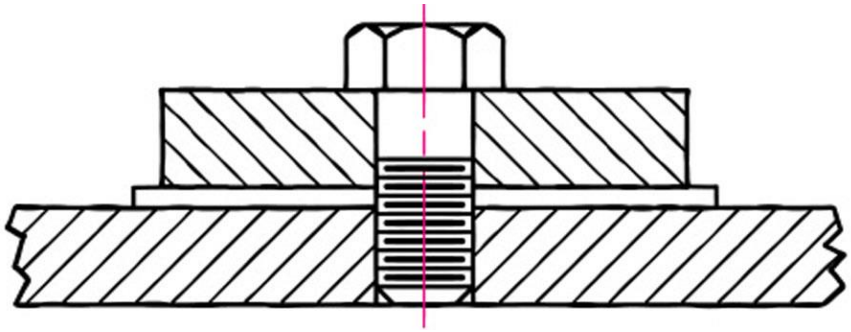
Surfaces and edges in section views

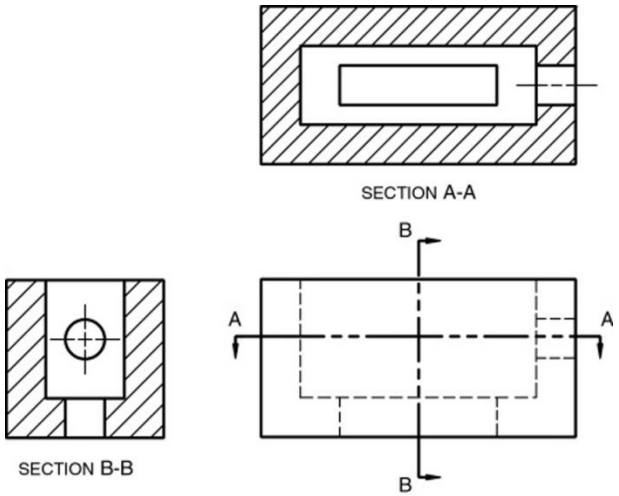


Positioning

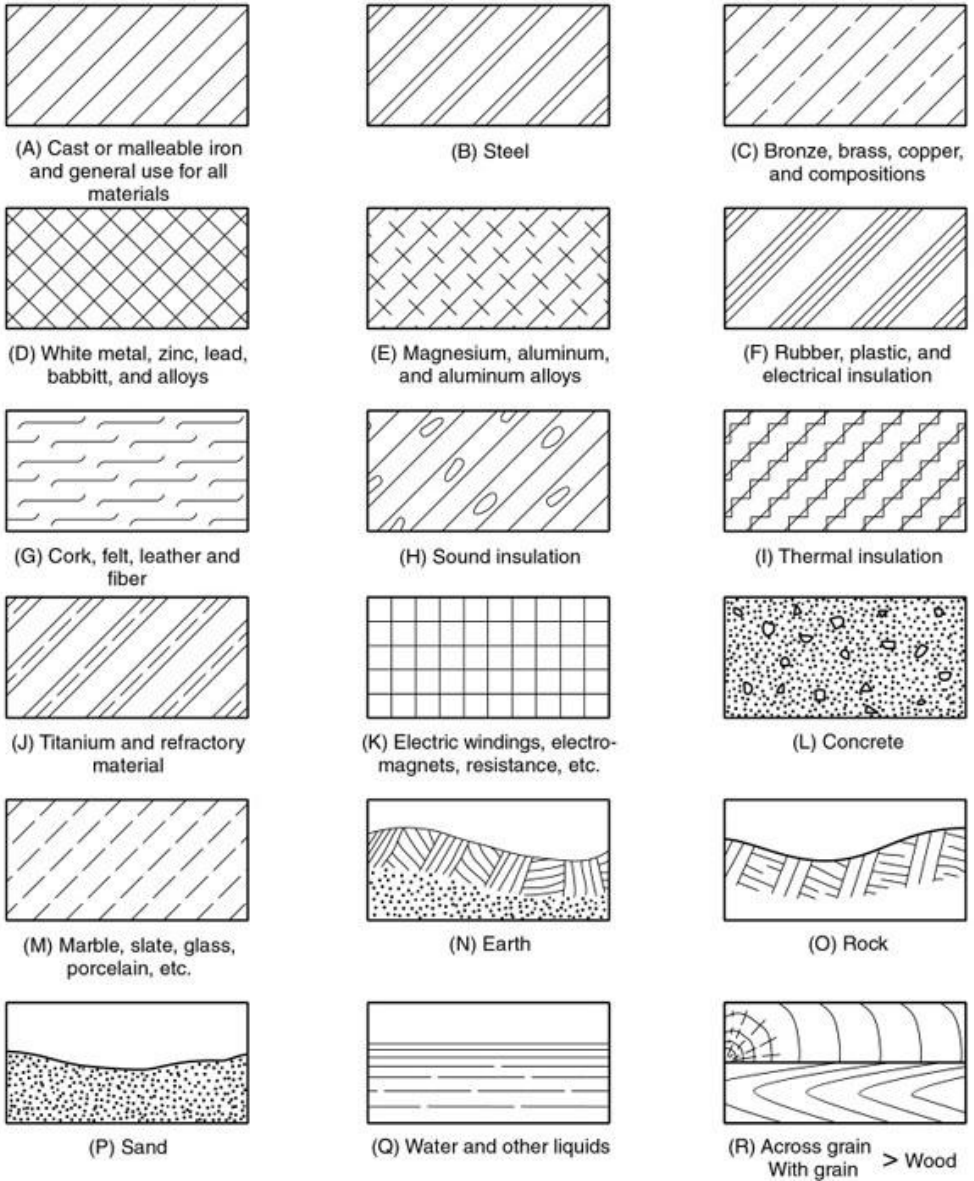


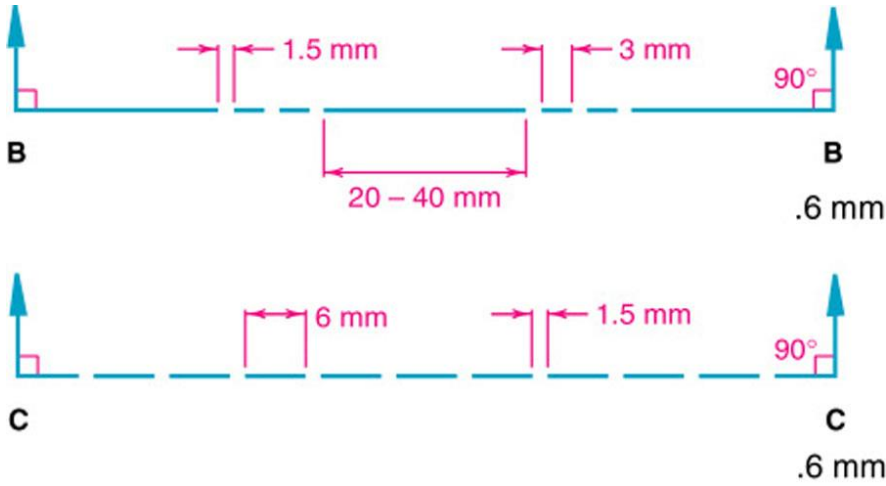
Hatching of thin parts

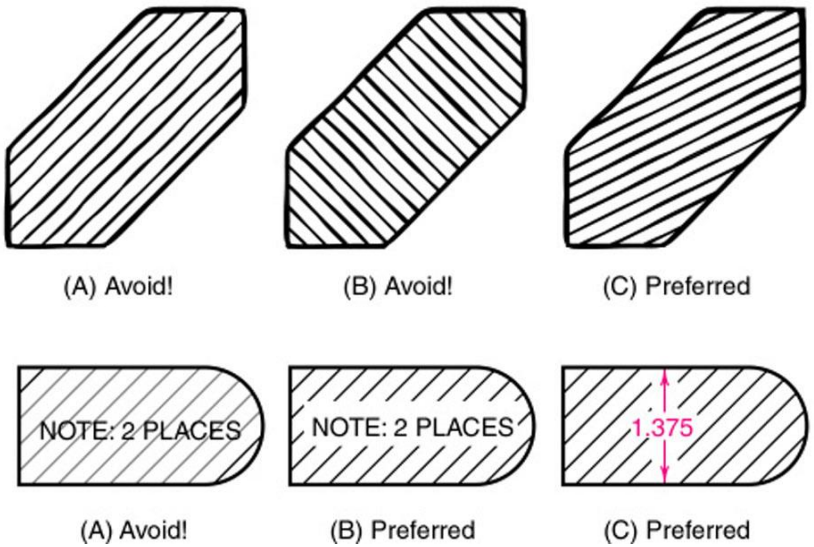




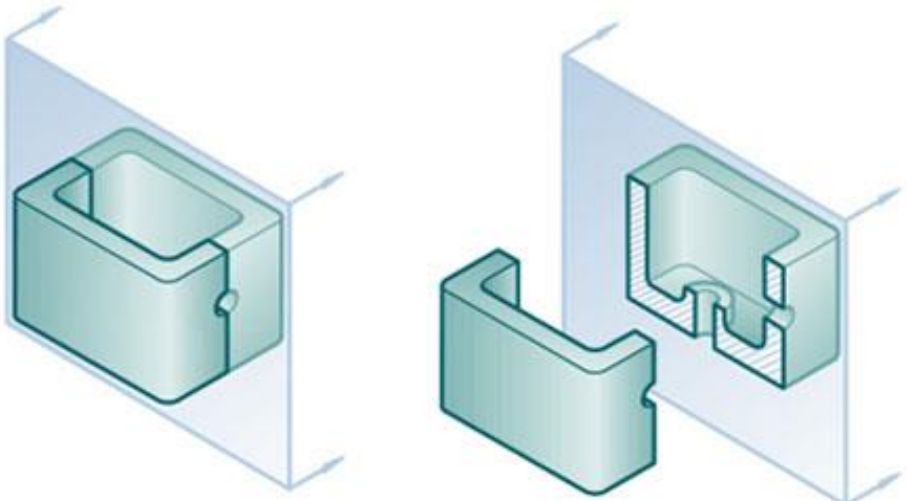
Hatch features



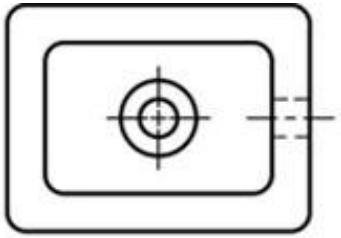


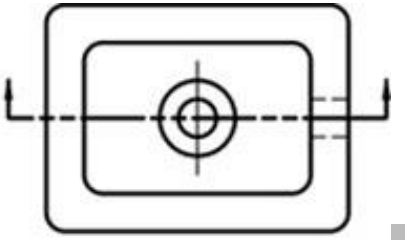


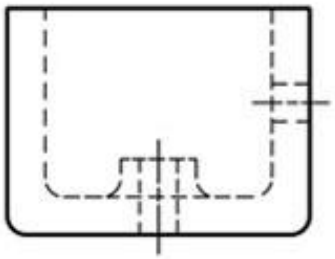
Section types



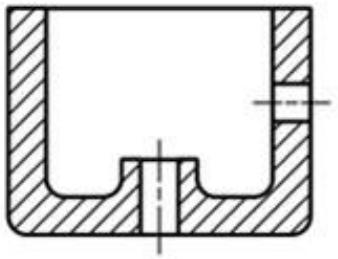
(A) Full section



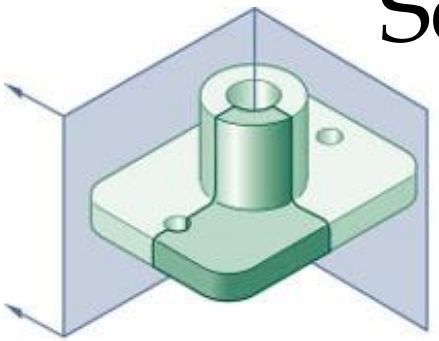


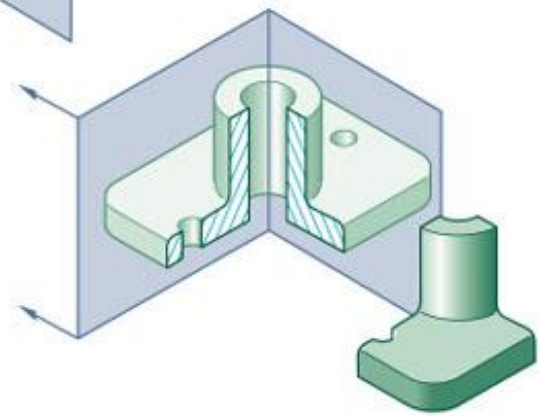


(B) Standard multiview

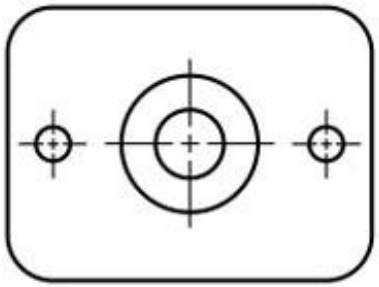


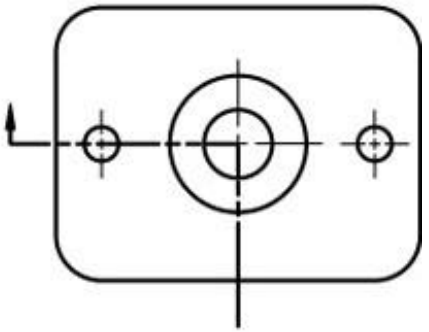
(C) Full section view

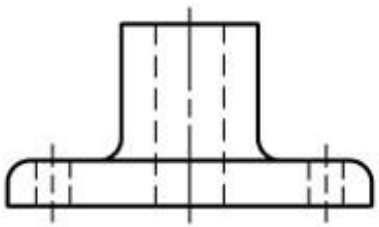




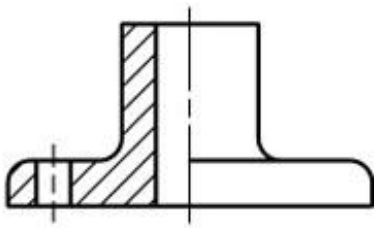
(A) Half section





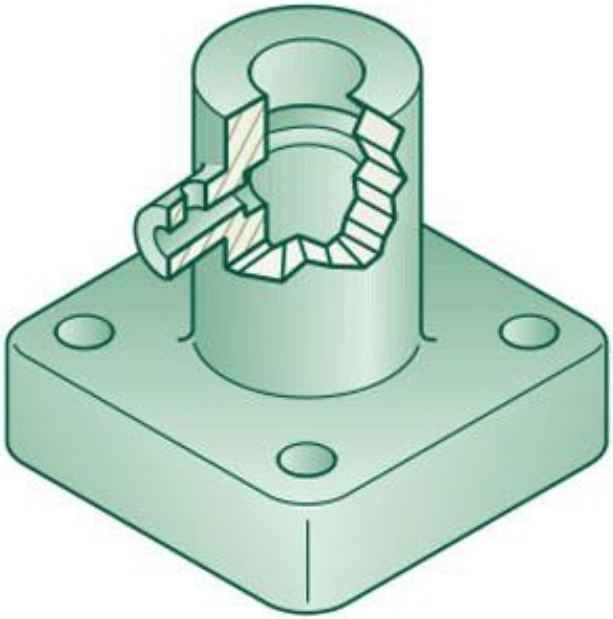


(B) Multiview

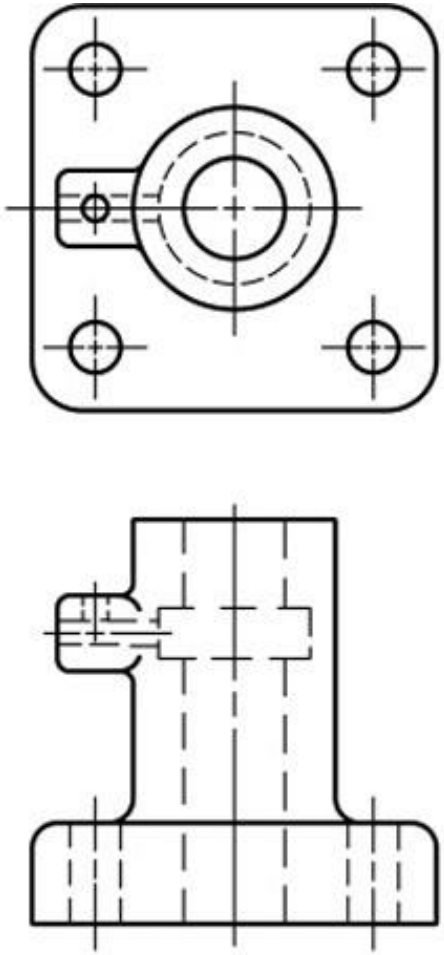


(C) Half section view

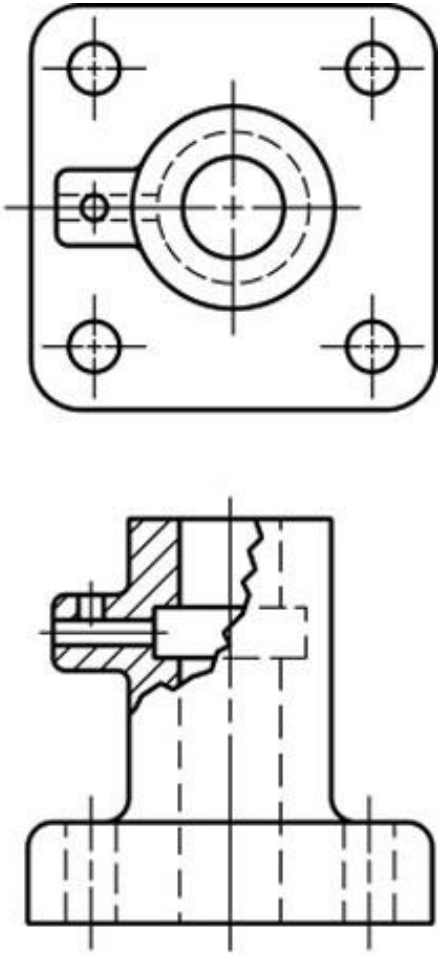
Broken out section



(A) Broken-out section

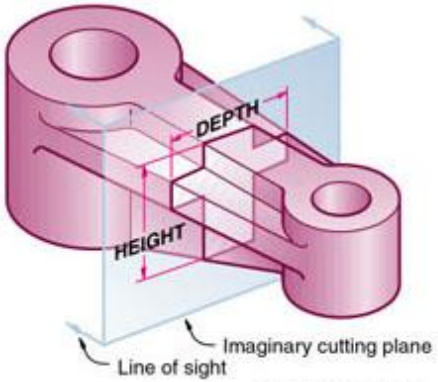


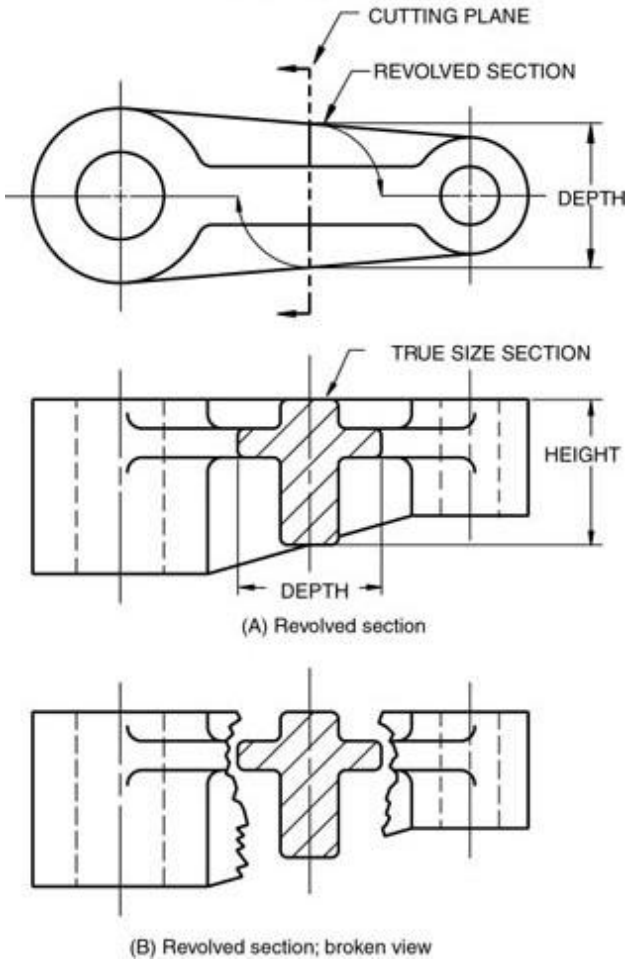
(B) Multiview

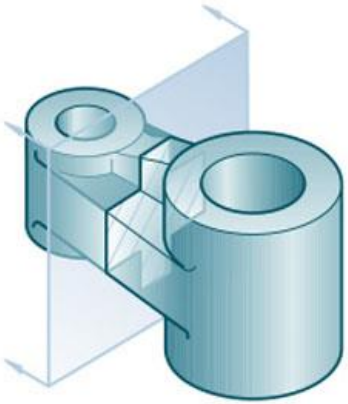


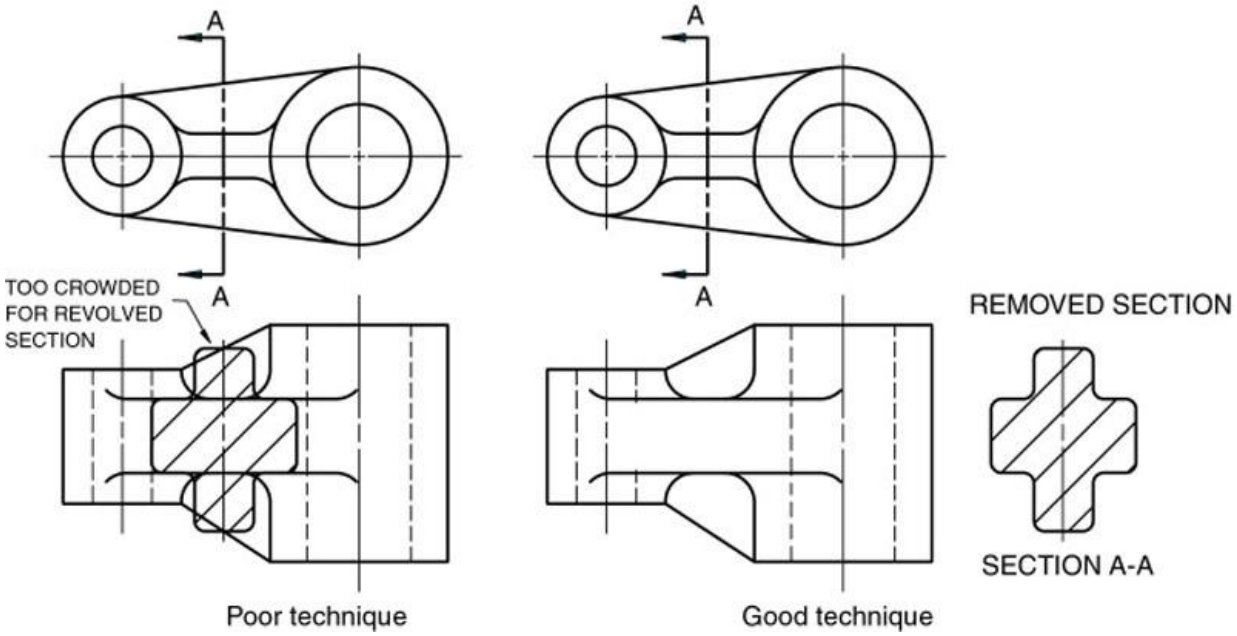
(C) Broken-out section view

Revolved & Removed

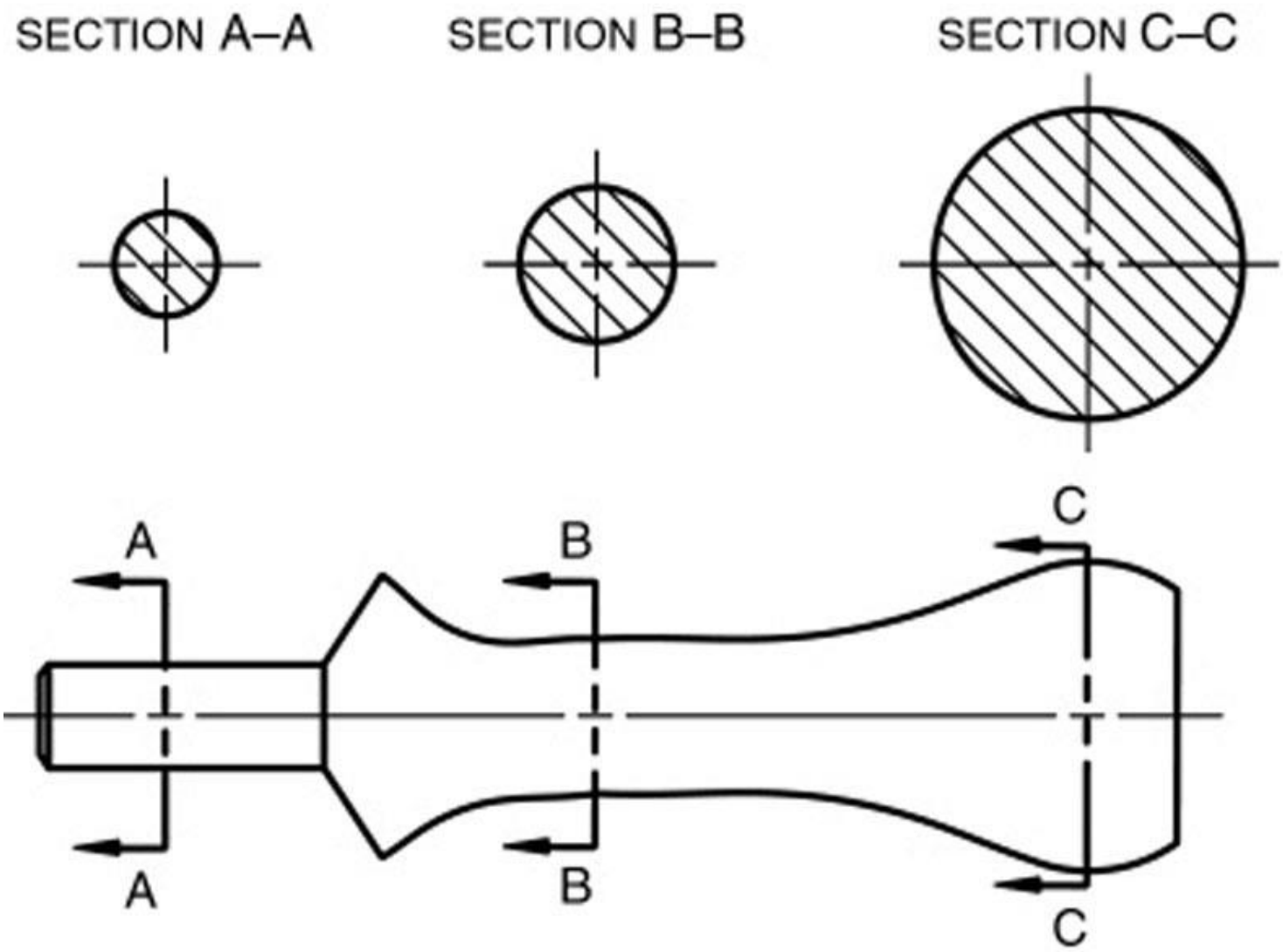




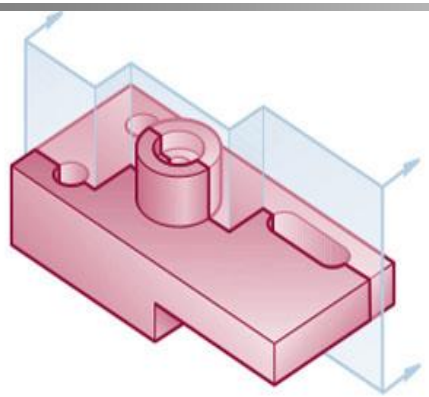


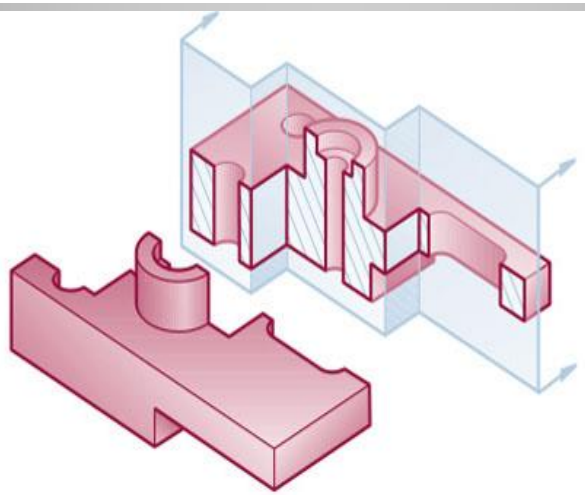


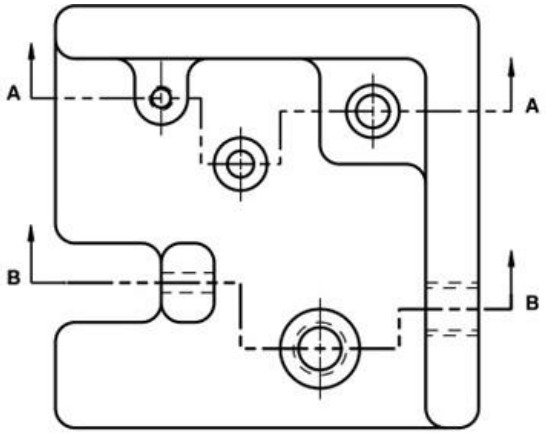
Multiple removed section views

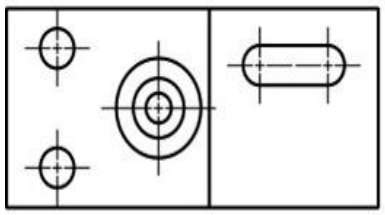


Offset section

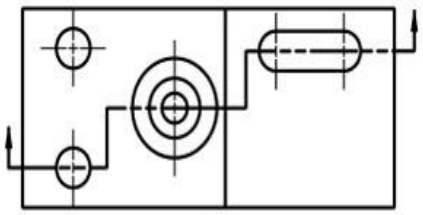




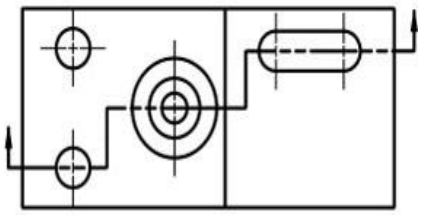




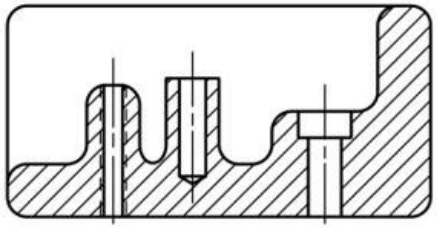
Normal multiview



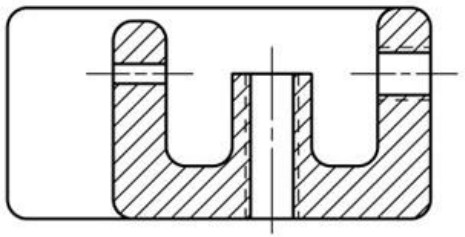
(A) Offset section view



(B) No!

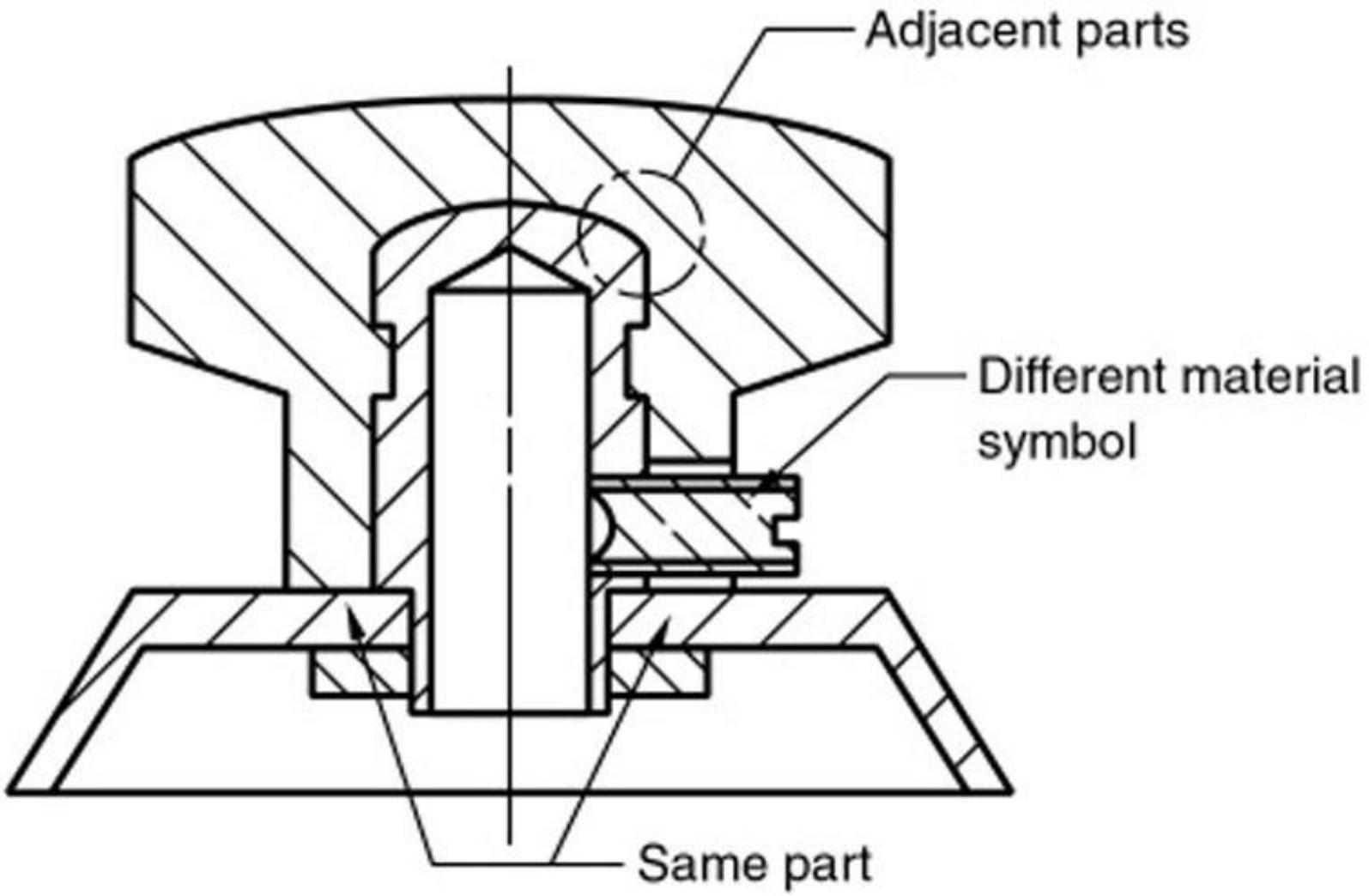


SECTION A-A

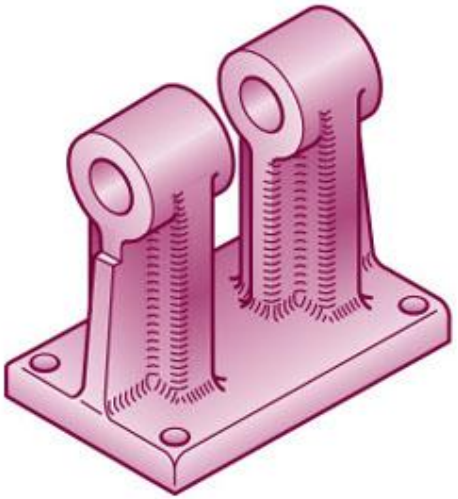


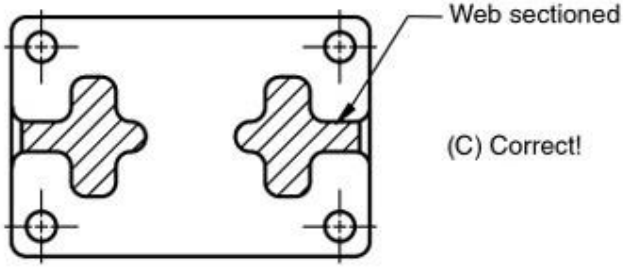
SECTION B-B

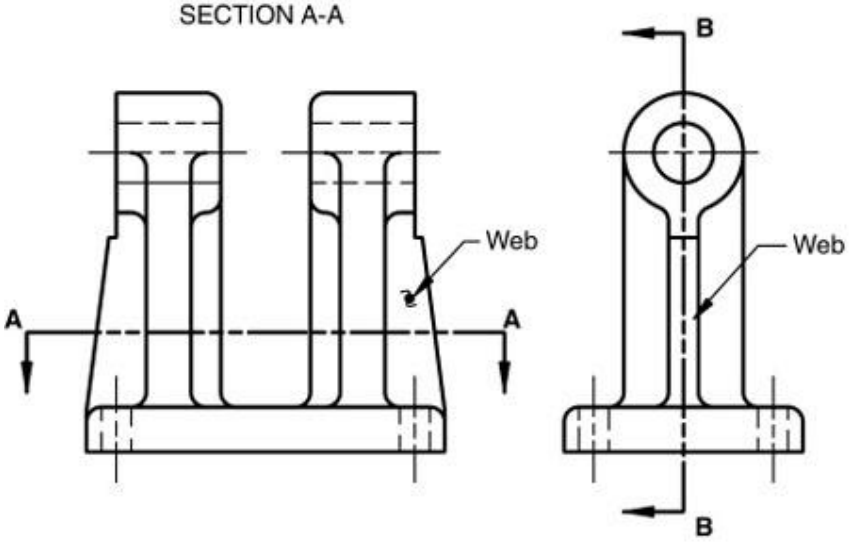
Assembly section

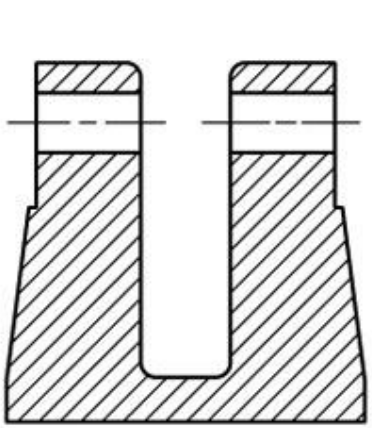


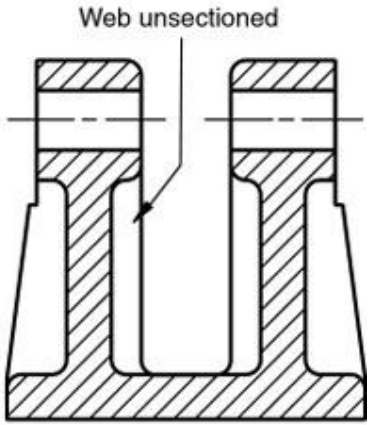
Convention for webs





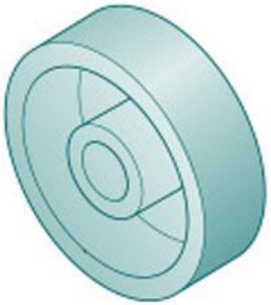




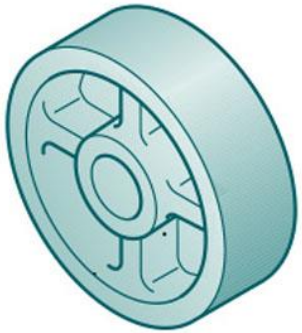


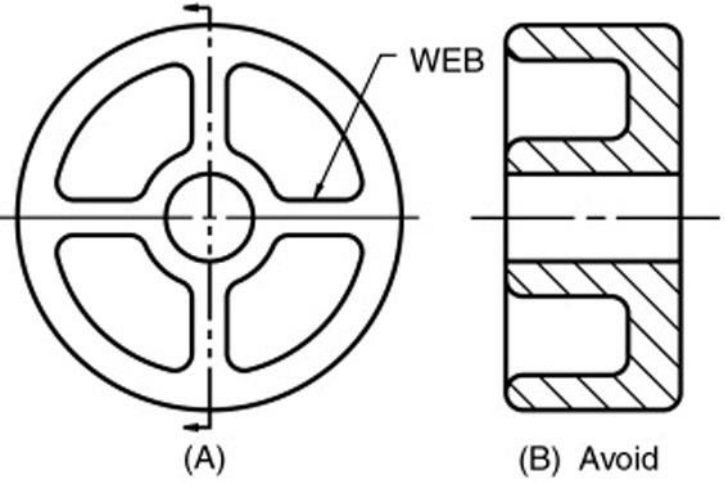
Alternate methods for webs

With webs



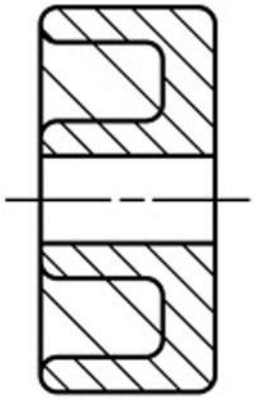
Without webs



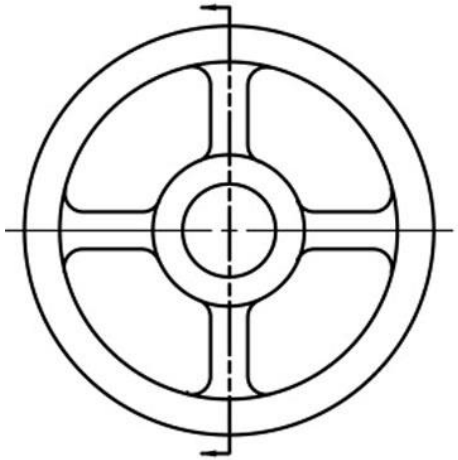


(A)

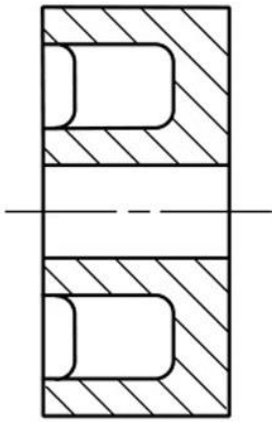
(B) Avoid



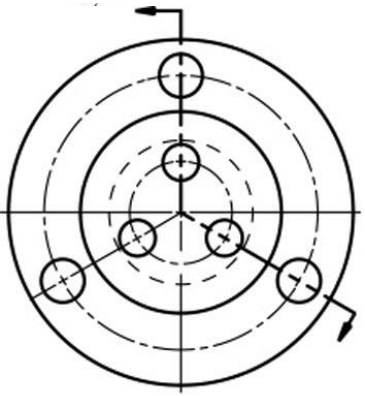
(C) Preferred

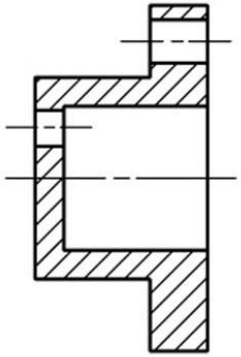


(A)

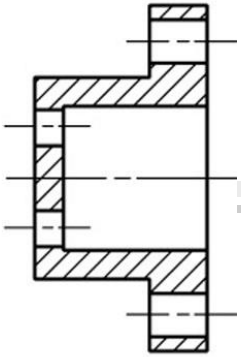


(B)



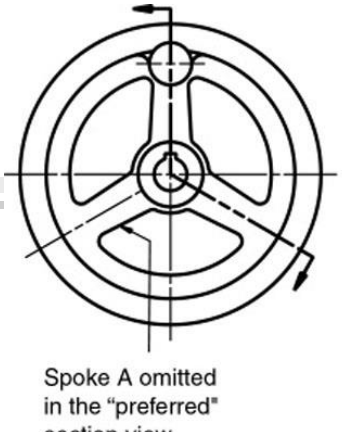


(A) True Projection

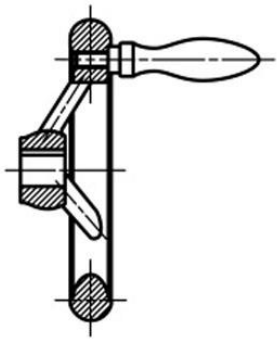


(B) Preferred

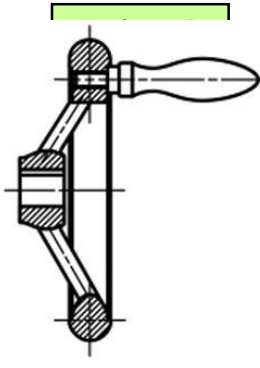
Aligned sections



Spoke A omitted in the "preferred"

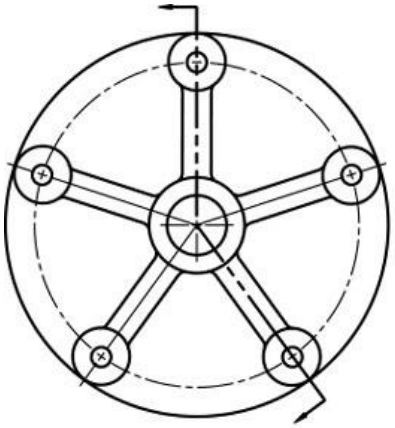


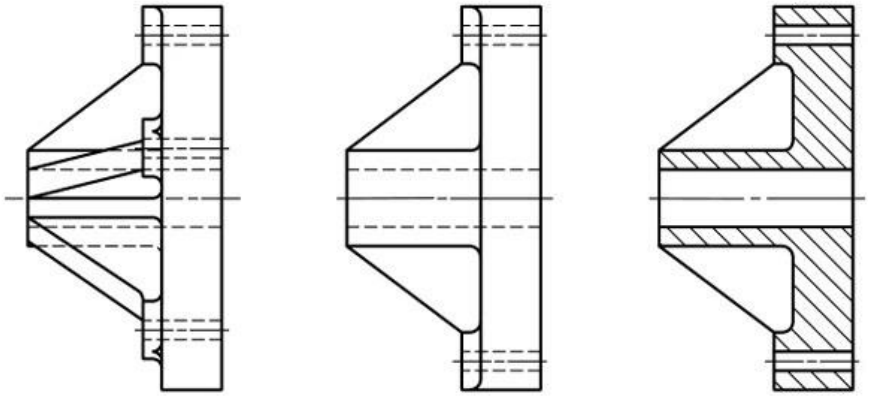
True Projection



Preferred

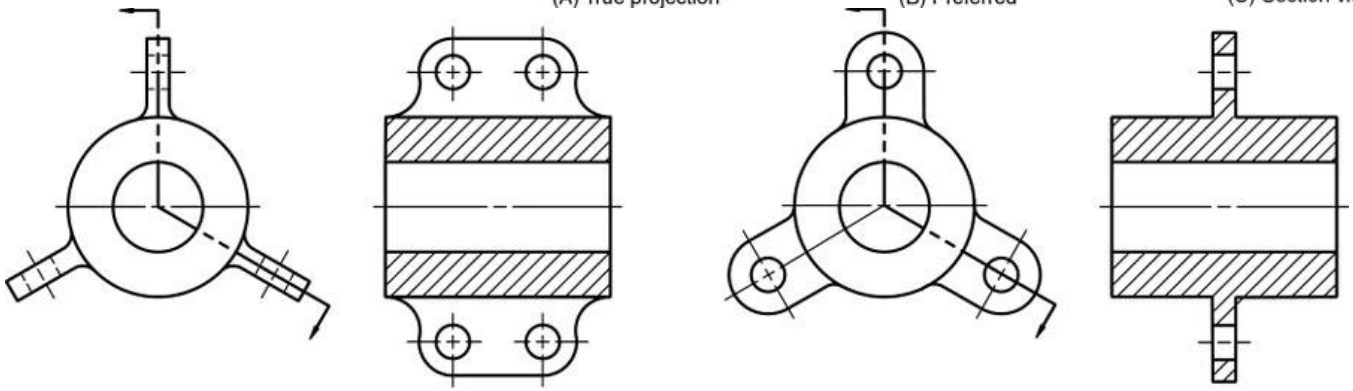
Aligned spokes





(A) True projection (B) Preferred (C) Section view

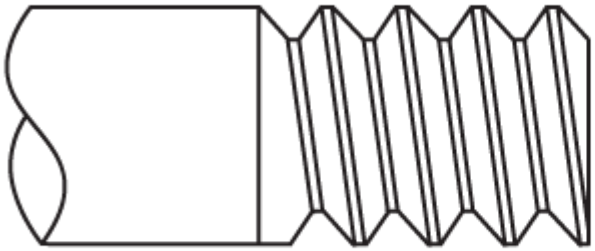
Aligned ribs



(A) (B)

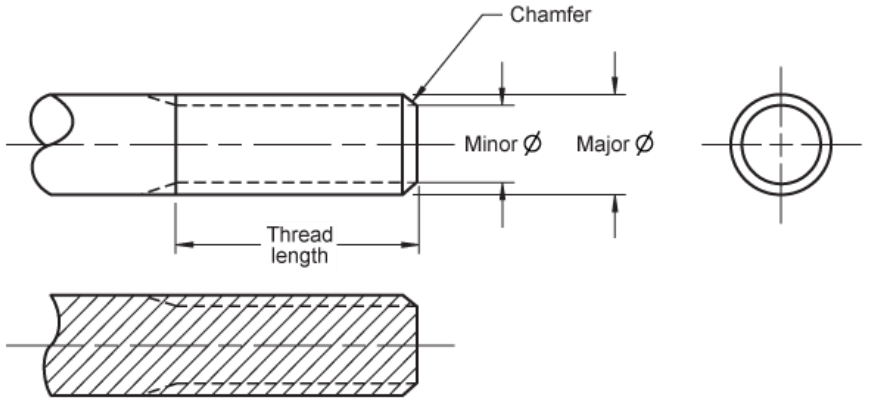
Aligned lugs

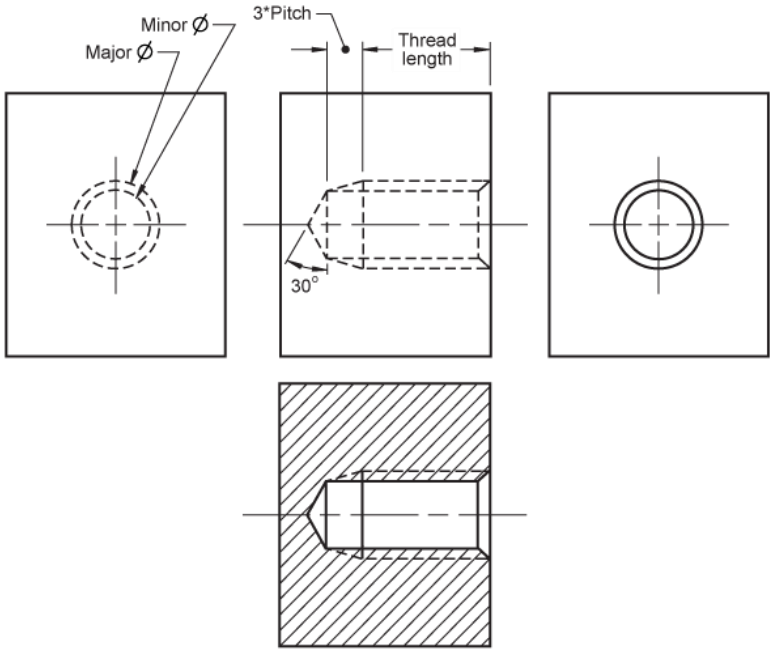
Threads

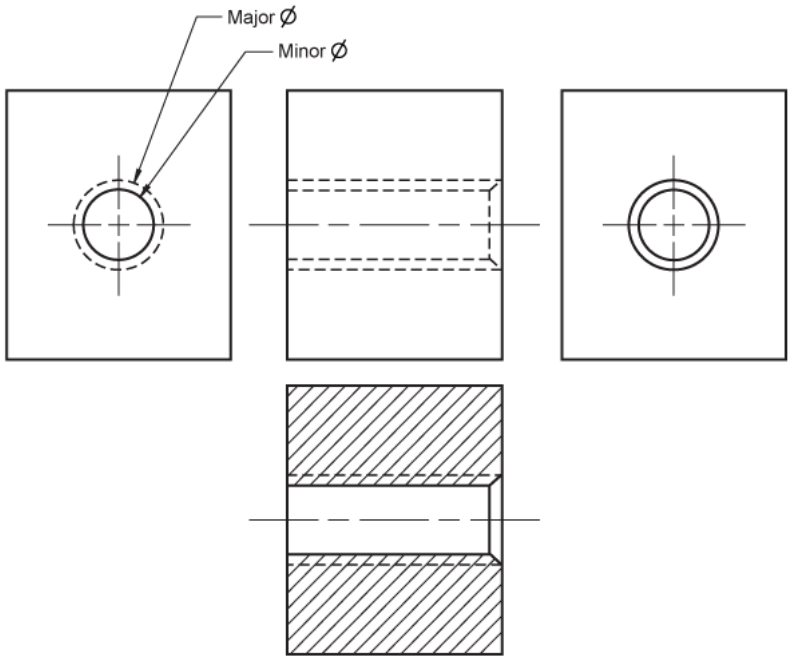


External Threads

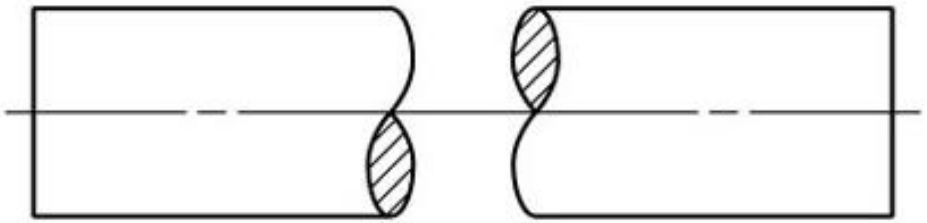
Internal Threads



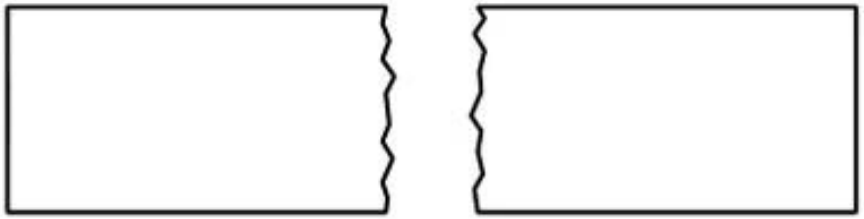




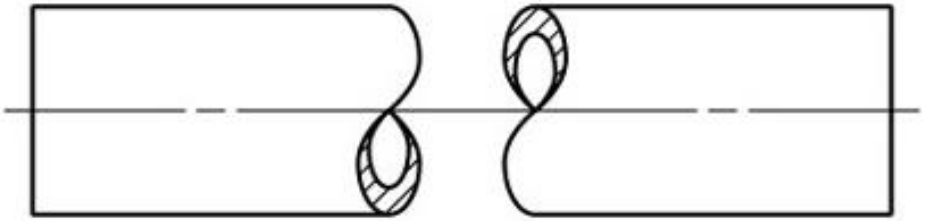
Break symbols



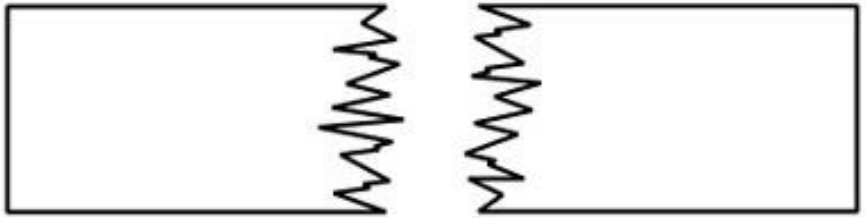
(A) Round solid



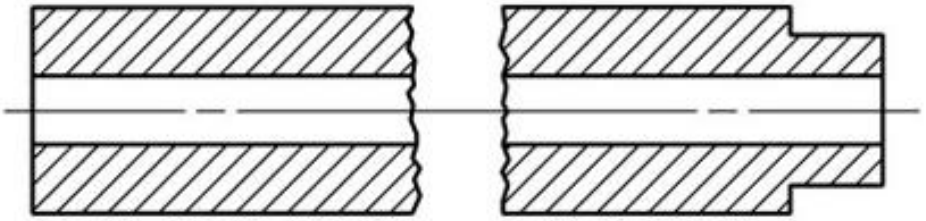
(D) Rectangular



(B) Round tubular



(E) Rectangular wood



(C) Round tubular

Exercise DrE-3

City University London
School of Engineering and Mathematical Sciences

Engineering Drawing and Design, EM 1105 (EM1.5)

Exercise code: DrE-3
Exercise type: Individual
Exercise title: Orthographic projections and sectioning

Exercise Assignment:

Use A3 paper with standard border. Divide the drawing space in two equal parts and:

1) From Figure 1 draw in scale 1:1 the view in the direction of arrow X and the offset section on section plane A-A.
2) From Figure 2 draw in scale 1:2 section views on section planes A-A and B-B one underneath the other

Exercise tips:
Always read exercise assignment carefully.
This exercise requires using scales – NOT FREEHAND. Arrange drawings neatly and ensure all letters and lines are made according to BS308.

Hand in A3 drawing to your tutor during tutorials in week 6 (6th and 7th November 2003). Ensure that name, group and other relevant data are filled in the title block

Figure 1.

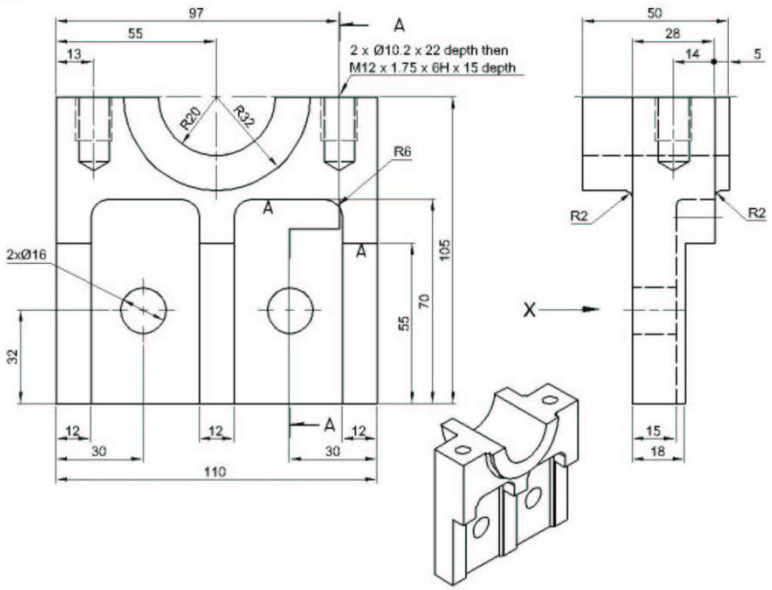


Figure 2.