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**Mech 220**  
**Engineering Graphics**  
**Section Views 1/2**

**Fall 2017-2018**

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# Mech 220: 4th LECTURE

## SECTION VIEWS:

### Overview

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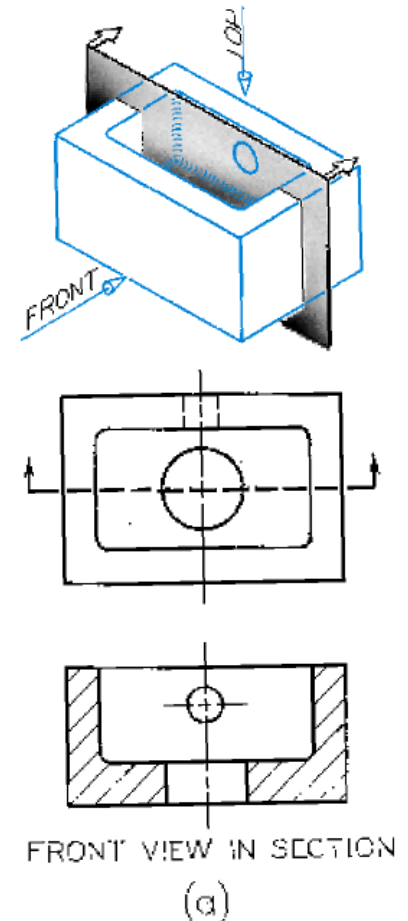
- ◆ **Section View technique is the final piece of the technical drawing puzzle.**
- ◆ **Section Views Gives the draftsmen a certain freedom when it comes to creating more readable views.**
- ◆ **Several types of sections are available for use clarifying the interior of a part:**
  - Full Section
  - Offset Section
  - Half section
  - Aligned Section
  - Revolved/Rotated Section
  - Removed Section
  - Assembly Section

# Mech 220: 4th LECTURE

## SECTION VIEWS:

### Overview

- ◆ Sections are used to show interior details of a model clearly.
- ◆ Cutting-plane line shows where object was cut to obtain the section view.
- ◆ Cross hatching in the section view shows the solid surface of the object which were cut through to produce the section.
- ◆ Section views may replace standard views.
- ◆ Conventional practices, such as not showing hatching on ribs and webs, makes sections easier to interpret correctly.

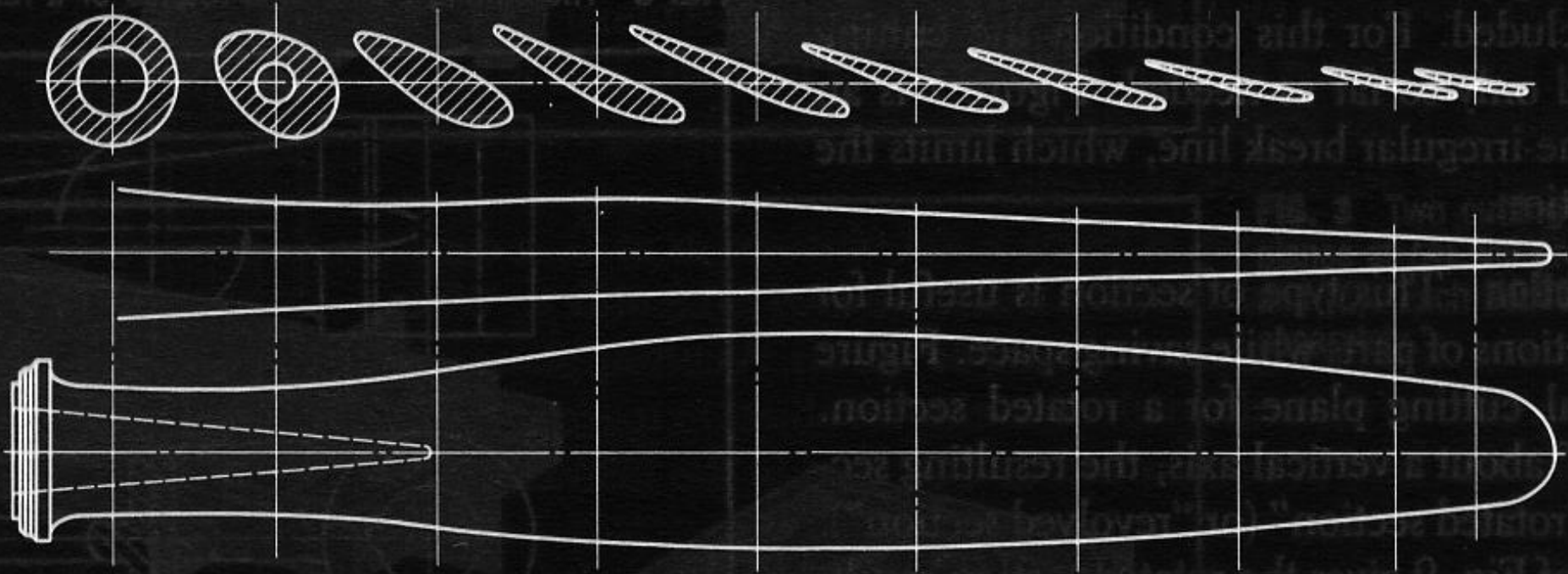


# Mech 220: 4th LECTURE

## SECTION VIEWS:

### Why have section views? Example 1

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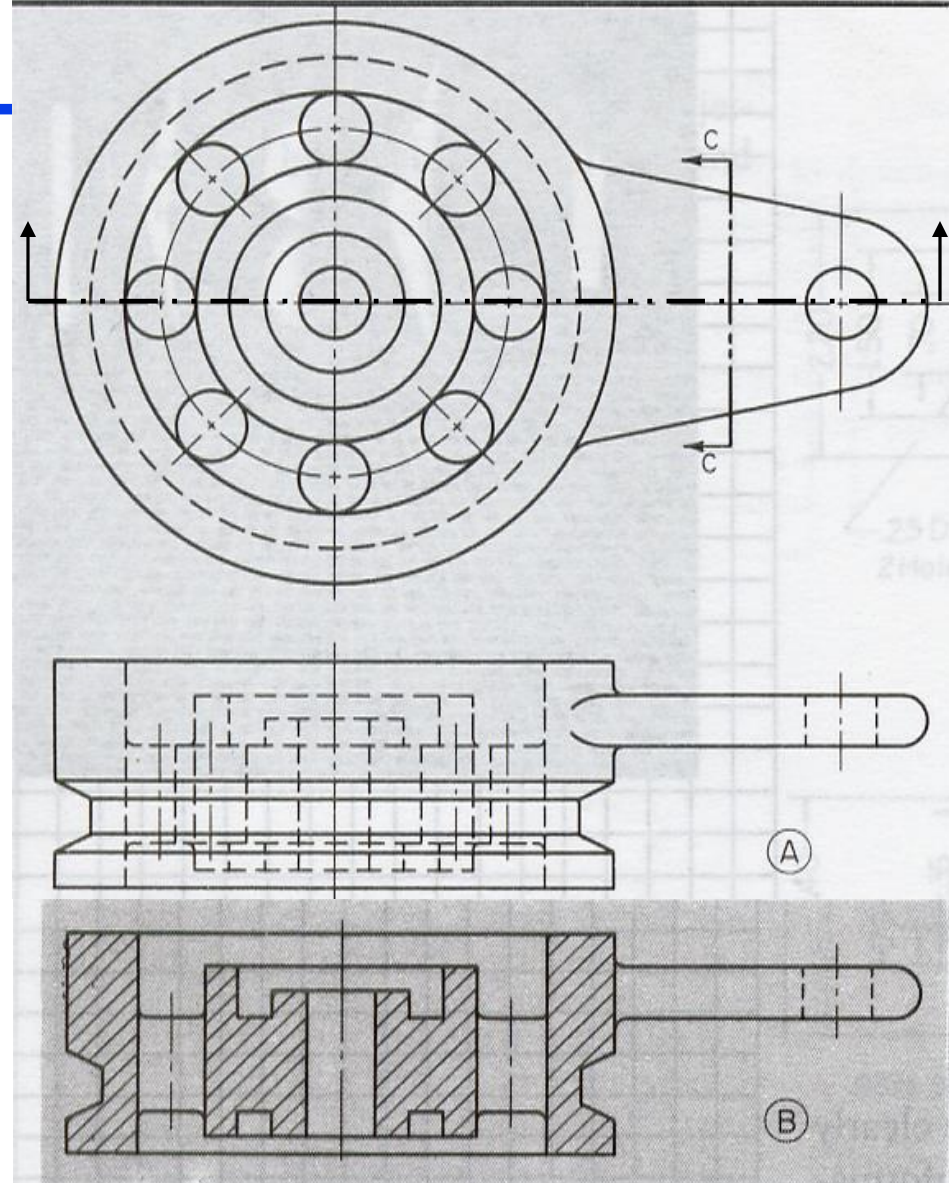


- ◆ Based on the front view and top, limited information is deduced concerning the shape of the object.
- ◆ Sectional views provides the necessary information, making the manufacturing process possible

# Mech 220: 4th LECTURE

## SECTION VIEWS: Why have section views? Example 2

- ◆ Figure above shows a part that has confusion front view because of numerous hidden lines.
- ◆ A portion of the part can be cut away to reveal the interior. The imaginary cut is called a “sectional view”.
- ◆ Sectioning helps obviously in clarifying the interior of the part.



# Mech 220: 4th LECTURE

## SECTION VIEWS:

### Concept & Definition

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Therefore, *Section* Views are used to clarify views by showing/revealing the internal features of a part (with solid lines).

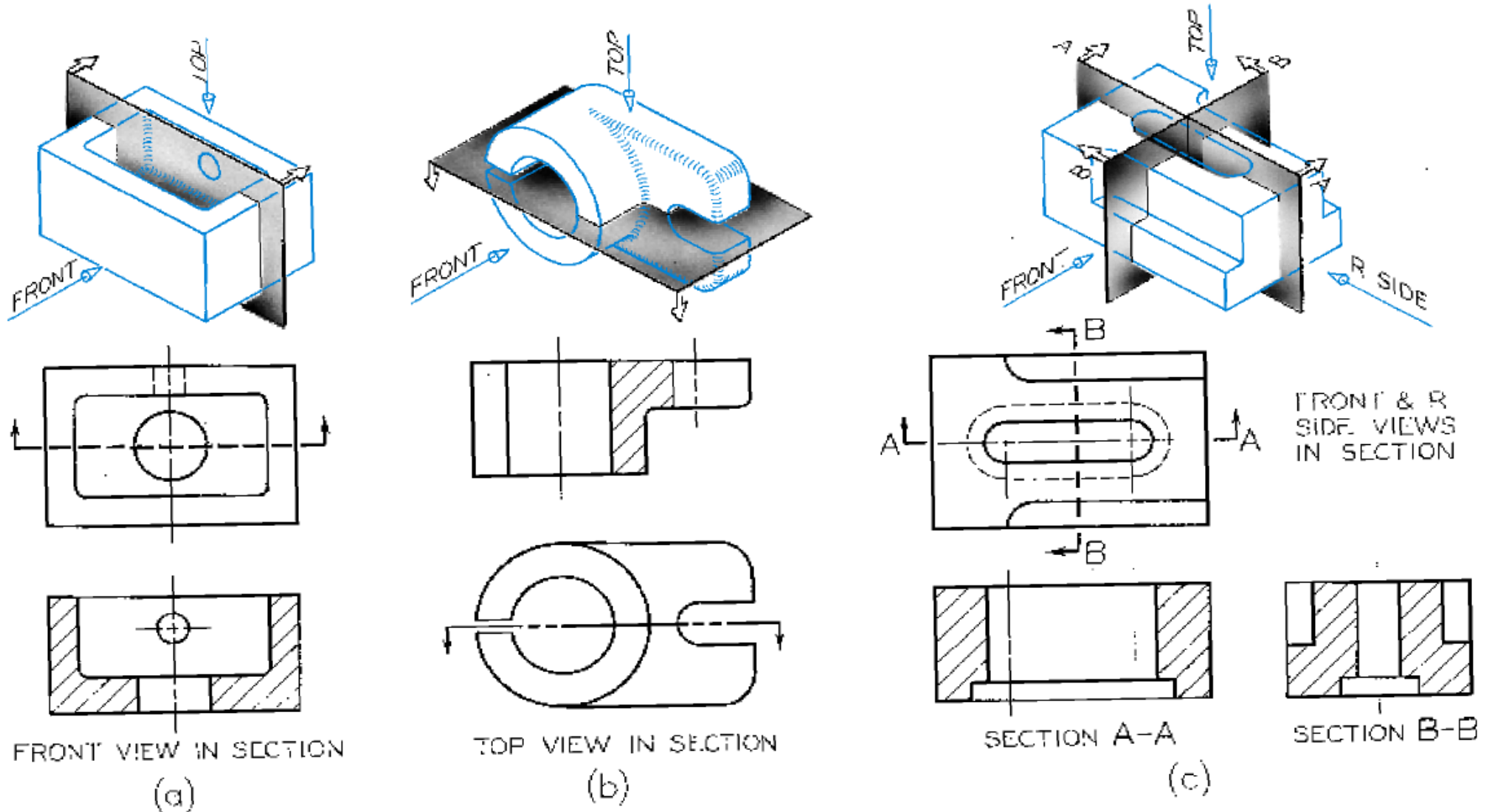
To accomplish this, an **imaginary Cutting Plane** is used.

If a SECTION view shows more detail than say an ORTHO view then the drafter may decide to use the section view to replace the ortho view.

# Mech 220: 4th LECTURE

## SECTION VIEWS:

### Cutting Planes & Sections



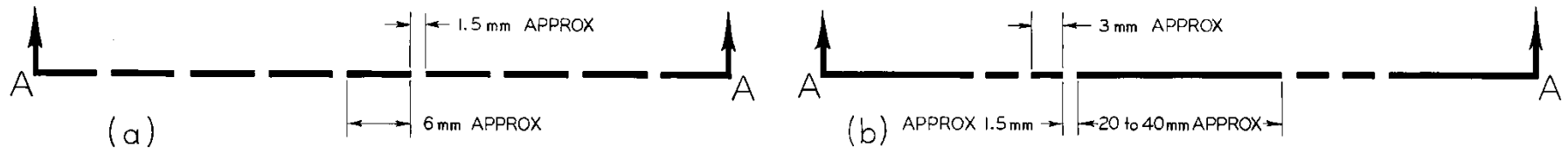
- ◆ **Cutting plane is the imaginary medium used to show the path of cutting an object to make a section**

# Mech 220: 4th LECTURE

## SECTION VIEWS:

### The Cutting Plane Line

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- ◆ The cutting plane line can be left out when the section location is obvious, whenever there is any doubt the cutting plan line should be shown
- ◆ The cutting plane line is a thick dark line which uses one of two special patterns shown above.

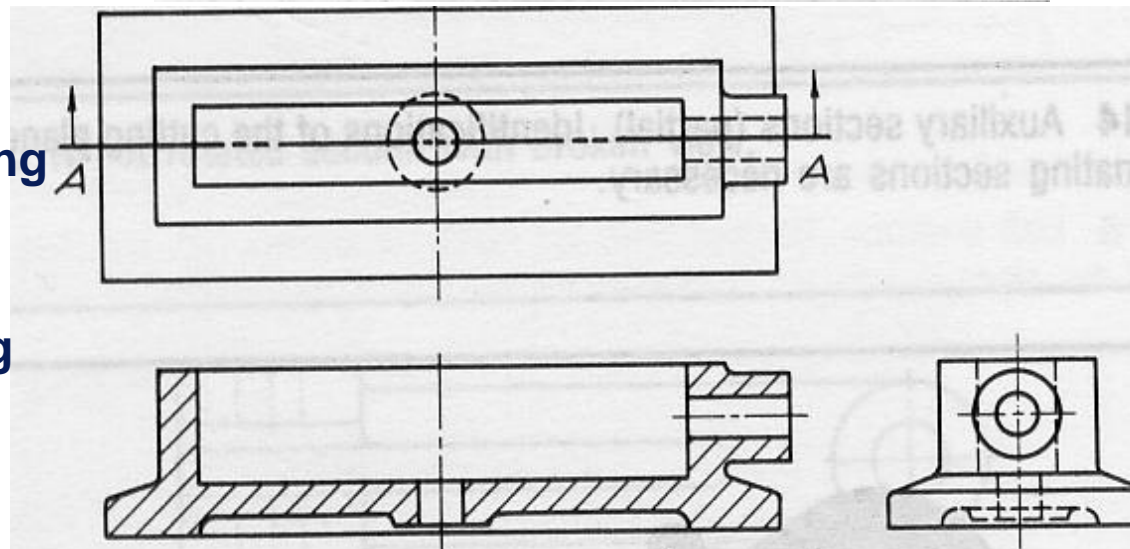
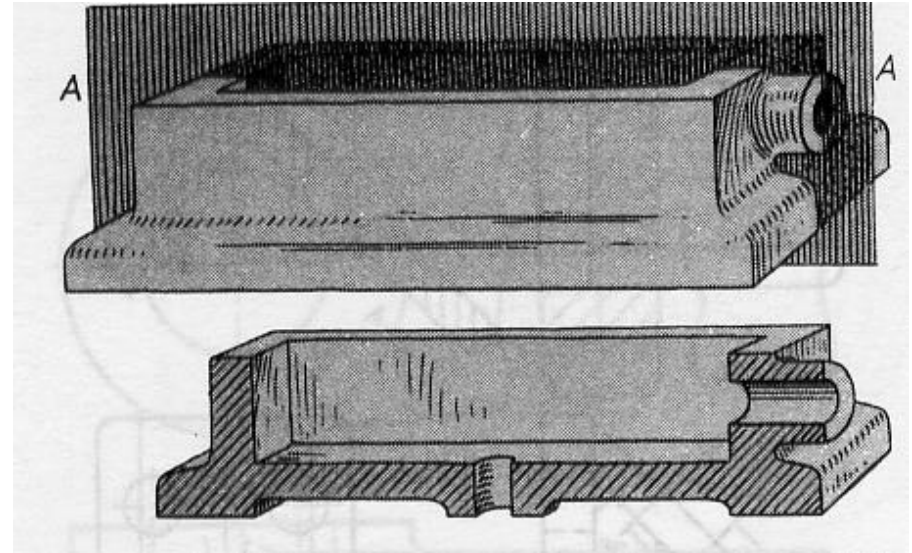


# Mech 220: 4th LECTURE

## SECTION VIEWS:

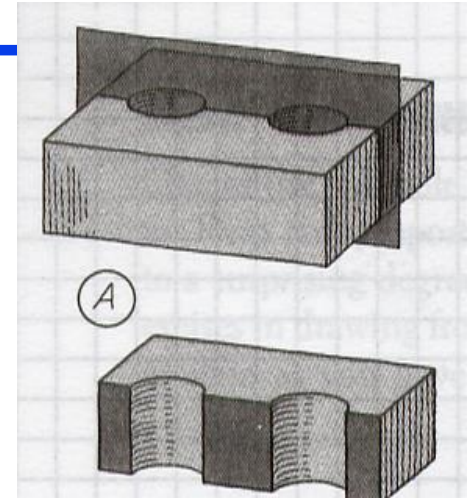
### How it is captured in a drawing: **the cutting plane**

- ◆ Step 1: Draw the best orthographic that shows true geometry and visible lines.
- ◆ Step 2: Place the cutting plane on the view to identify where the cut is made.
- ◆ Step 3: Place arrows on the cutting plane ends showing the direction from which the cut being viewed.
- ◆ Step 4: Draw what you see along the cutting plane and beyond.
- ◆ Step 5: Draw hatching lines identifying entities intercepting with the cutting plane.



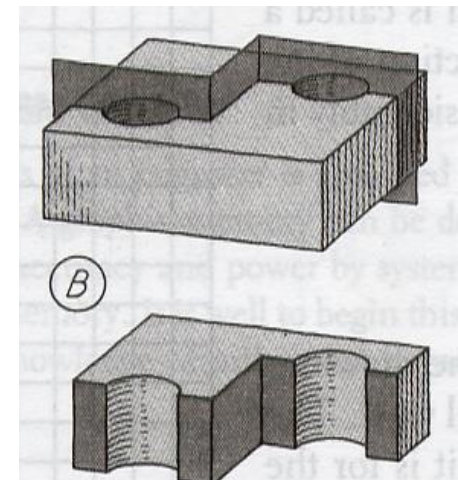
### Types of Sectional Views:

#### Straight Section



### Full Section View

#### Offset Section

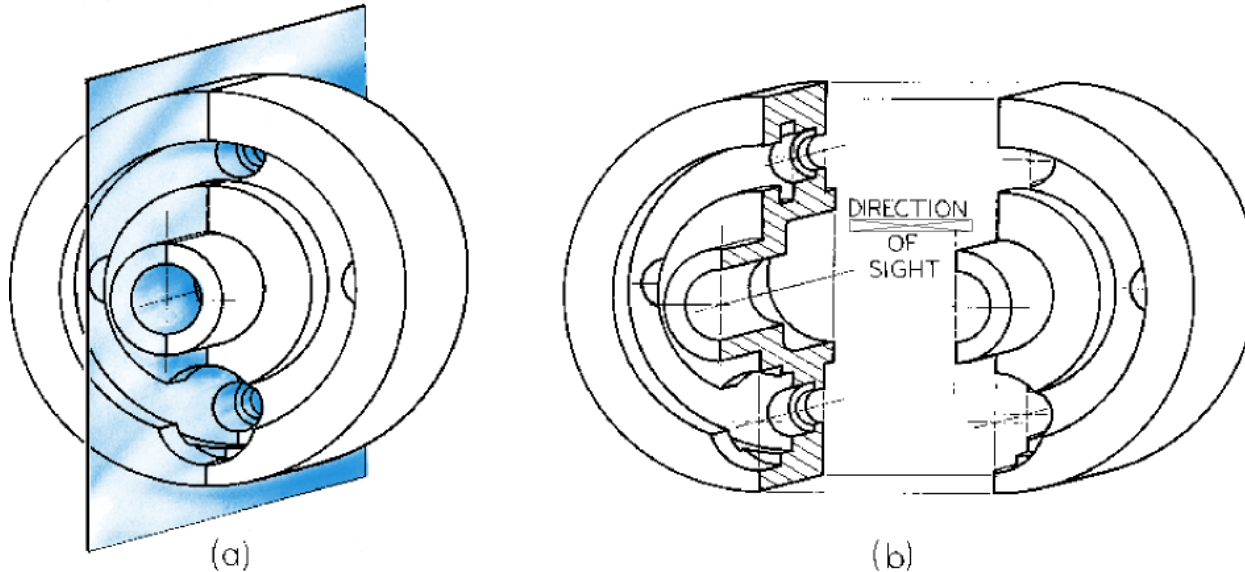


# Mech 220: 4th LECTURE

## SECTION VIEWS:

### Full Section

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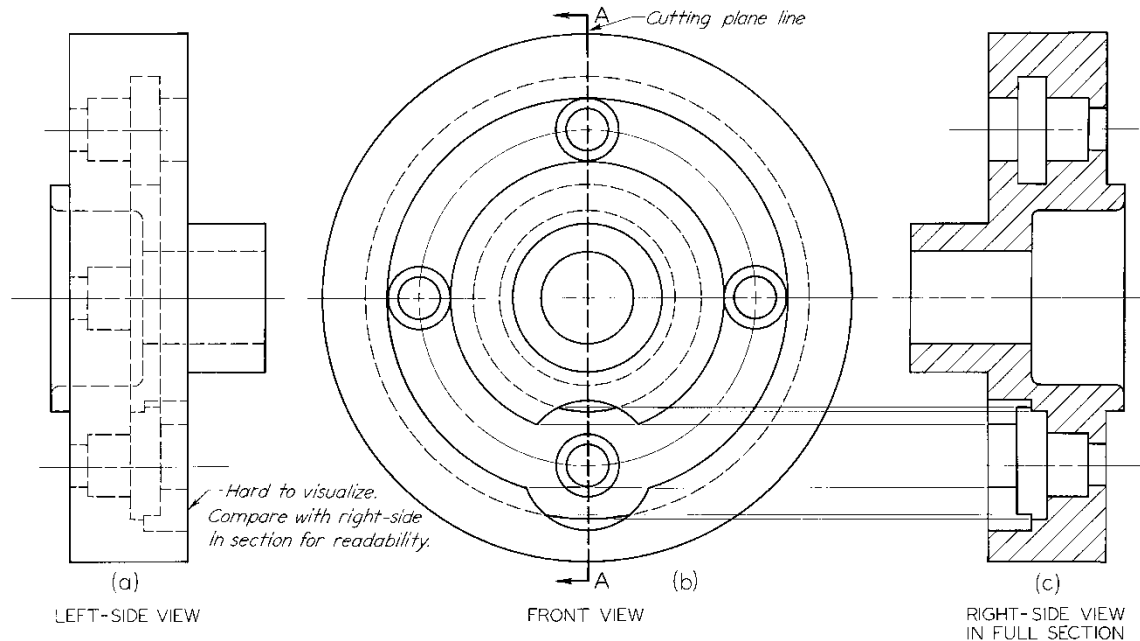


- ◆ A full section is a view in which the cutting plane passes entirely across the object.
- ◆ Imagine the object cut through by the cutting plane. Think of the two halves pulled apart and a take a look on to the cut half.

# Mech 220: 4th LECTURE

## SECTION VIEWS:

### Full Sections



- ◆ Full sections show the object cut in half
- ◆ Cutting plane line can be left out because it is understood to be through center
- ◆ Usually replaces a standard view

# Mech 220: 4th LECTURE

## SECTION VIEWS:

### **full section views: *straight* cutting plane- How it is done**

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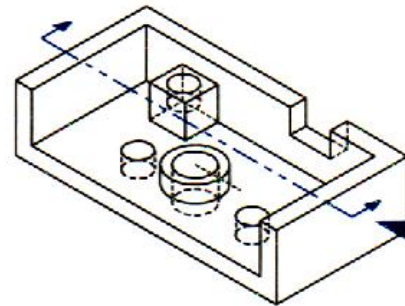
- ◆ Step 1: Draw good orthographic view first, usually perpendicular to the cutting plane.
- ◆ Step 2: Draw thick cutting plane line on the orthographic showing where the cut is to be generated.
- ◆ Step 3: Place arrowhead showing the position or the side from which the section is viewed.
- ◆ Step 4: Flip the sectional view to the side that arrowhead are pointing.
- ◆ Step 5: Project lines on the orthographic view initiated from the intersection of the model surfaces with the cutting plane.
- ◆ Step 6: Add section or hatch lines identifying the intersection of the object with the cutting plane.
- ◆ Step 7: Add centerlines to complete the view.

# Mech 220: 4th LECTURE

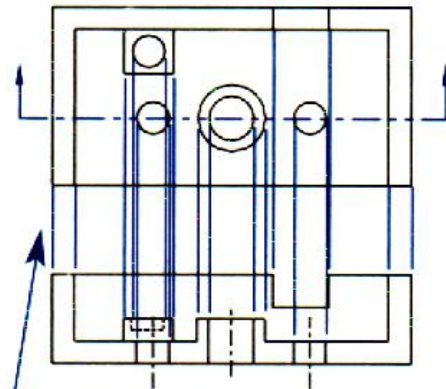
## SECTION VIEWS:

### full section views: *straight* cutting plane- **How it is done**

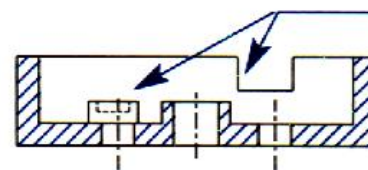
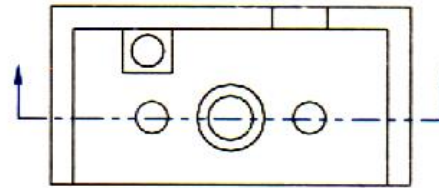
FIGURE 8.3



In a full section the cutting-plane line will pass continuously across the object from end to end.



Project lines down to locate the widths from the view with the cutting plane.



Details beyond the cutting-plane line may be shown in normal orthographic form.

Full Section

# Mech 220: 4th LECTURE

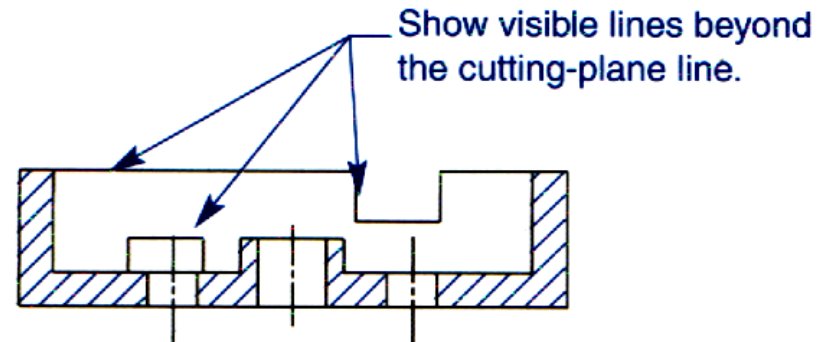
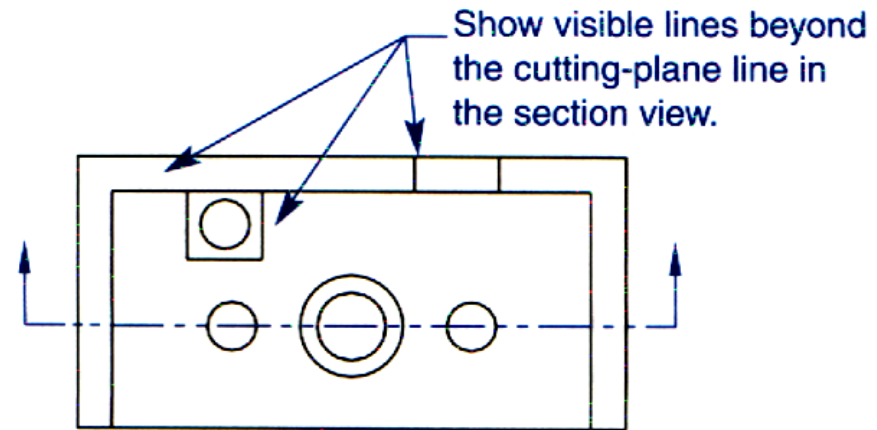
## SECTION VIEWS:

### full section views: *straight* cutting plane

#### Drafting Tip #1:

In the section view, show visible lines beyond the cutting plane line

- ◆ The area behind the cutting plane line is hatched where solid material is present.
- ◆ Items seen beyond the cutting plane have to be accounted for.



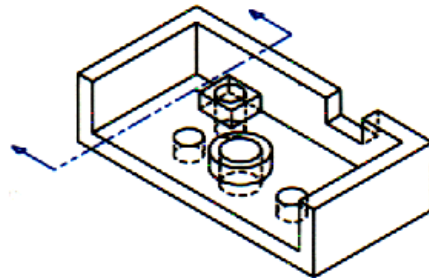
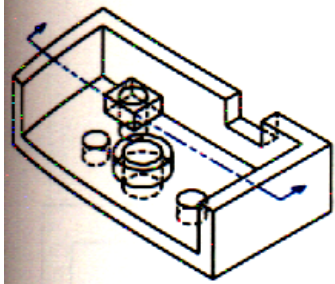
Full Section

FIGURE 8.37

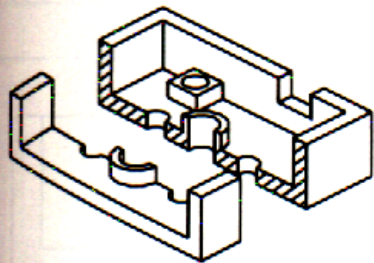
# Mech 220: 4th LECTURE

## SECTION VIEWS:

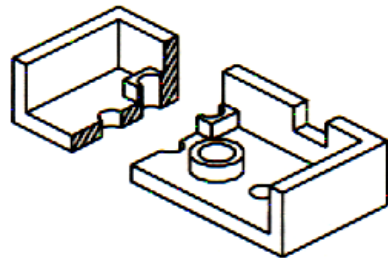
### full section views: *straight* cutting plane



In a full section the cutting plane line passes continuously across the object from end to end.

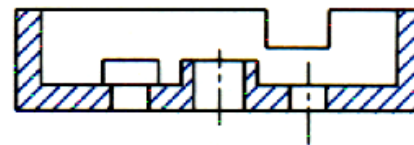
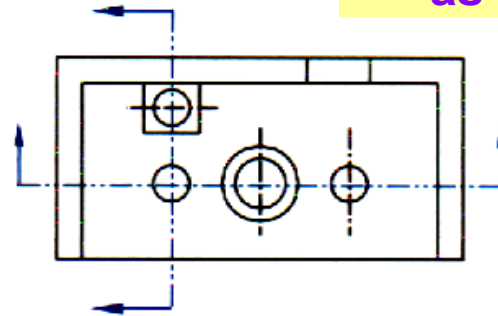


Full section taken from the long direction

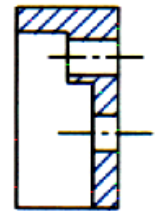


Full section taken from the short direction

(a)



Section through the length



Section through the width

### Drafting Tip #2:

On a drawing, you may use any number of sectional views as needed

(b)

**FIGURE 8.8** Multiple sections on the same drawing

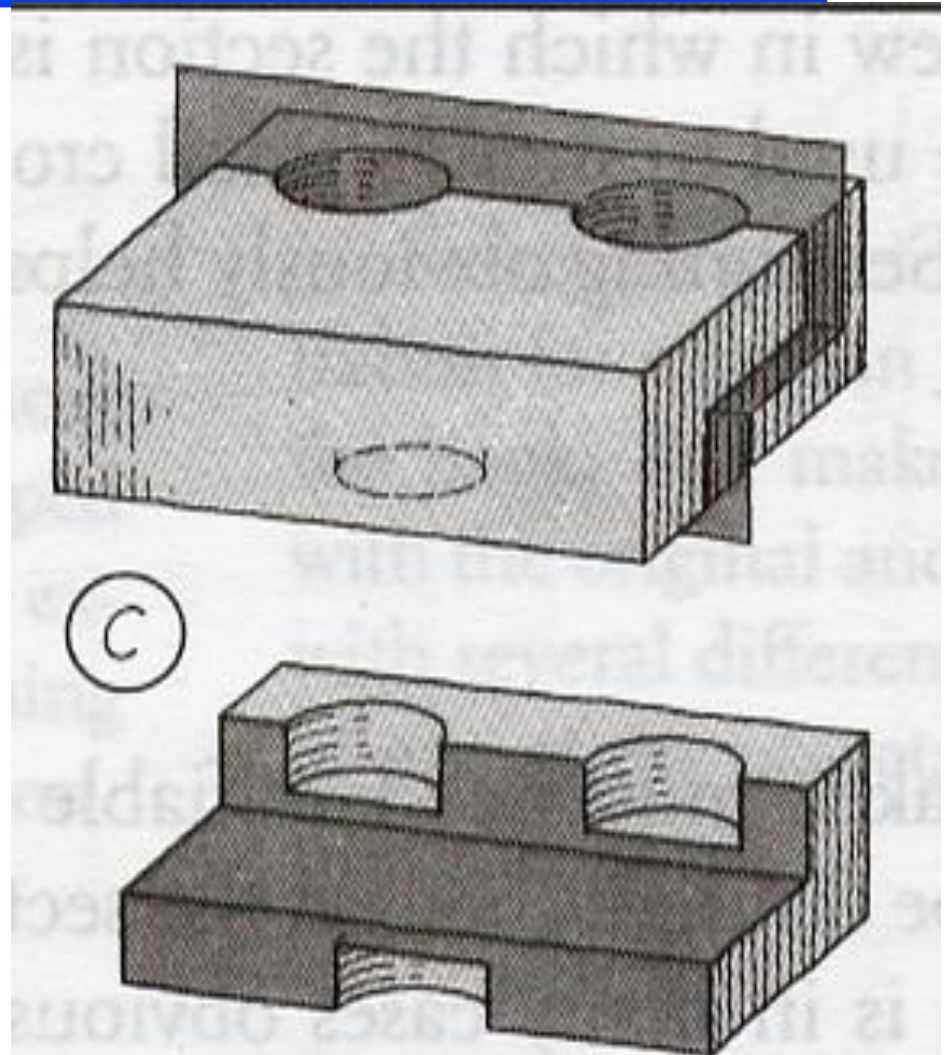


# Mech 220: 4th LECTURE

## SECTION VIEWS:

### full section views: *offset* cutting plane

- ◆ Offset sections provide a solution for objects with juggled or spread out features
- ◆ The offset cutting plane changes direction at  $90^\circ$  intervals.
- ◆ The direction change is best made about halfway between two different features



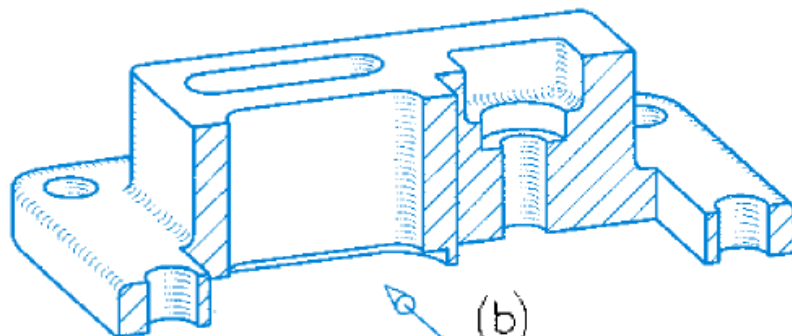
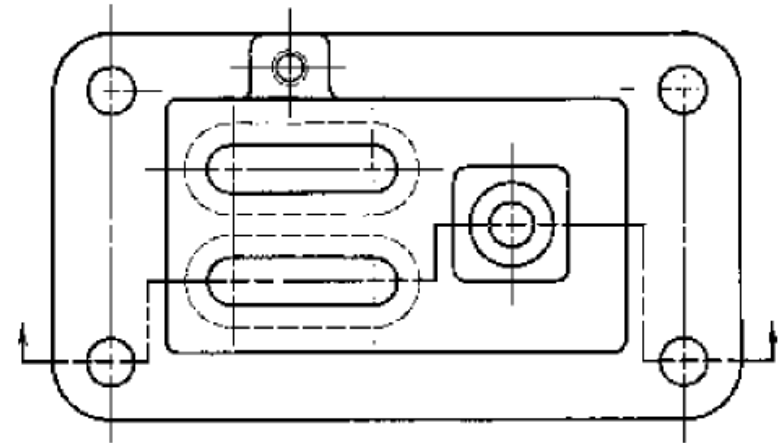
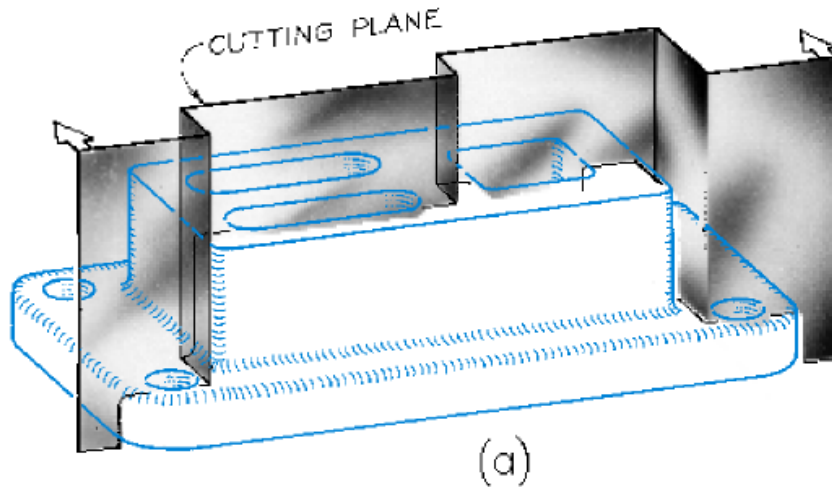
# Mech 220: 4th LECTURE

## SECTION VIEWS:

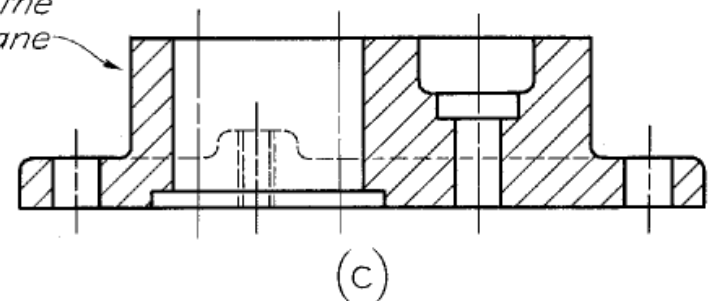
full section views: *offset* cutting views

### Drafting Tip #3:

On any section view, you may use any offset 'broken' plane as your cutting plane



*Do not show  
bends of the  
cutting plane*



◆ Offset sections are used for unsymmetrical parts.

# Mech 220: 4th LECTURE

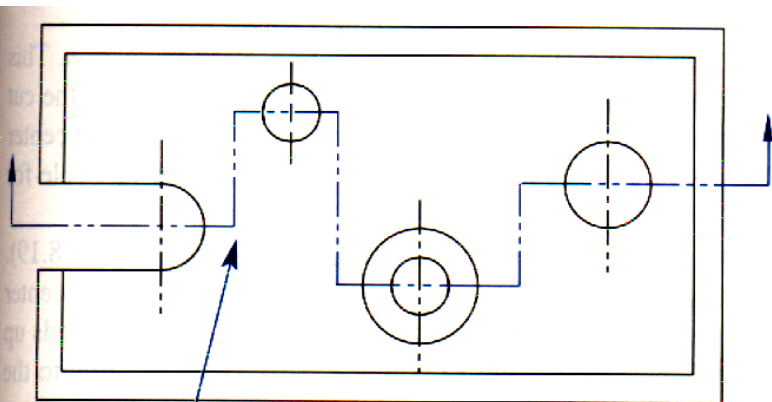
## SECTION VIEWS:

### full section views: *offset cutting plane*

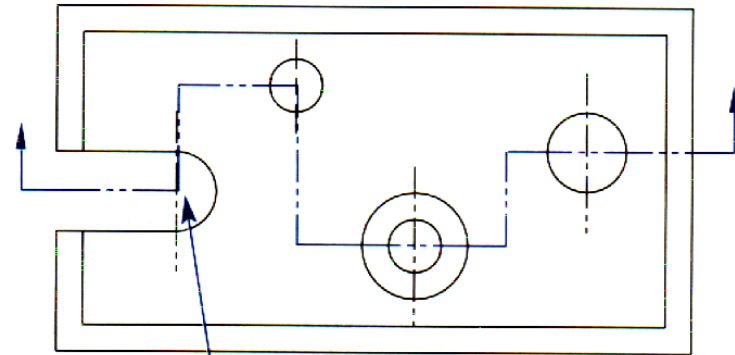
#### Drafting Tip #4:

Avoid changing direction of the cutting plane line before it passes through the feature completely

- ◆ The cutting plane should pass completely through the feature before changing direction
- ◆ Always change direction of the cutting plane midway between adjacent features.



Correct  
The cutting-plane line should pass completely through the feature before changing directions.

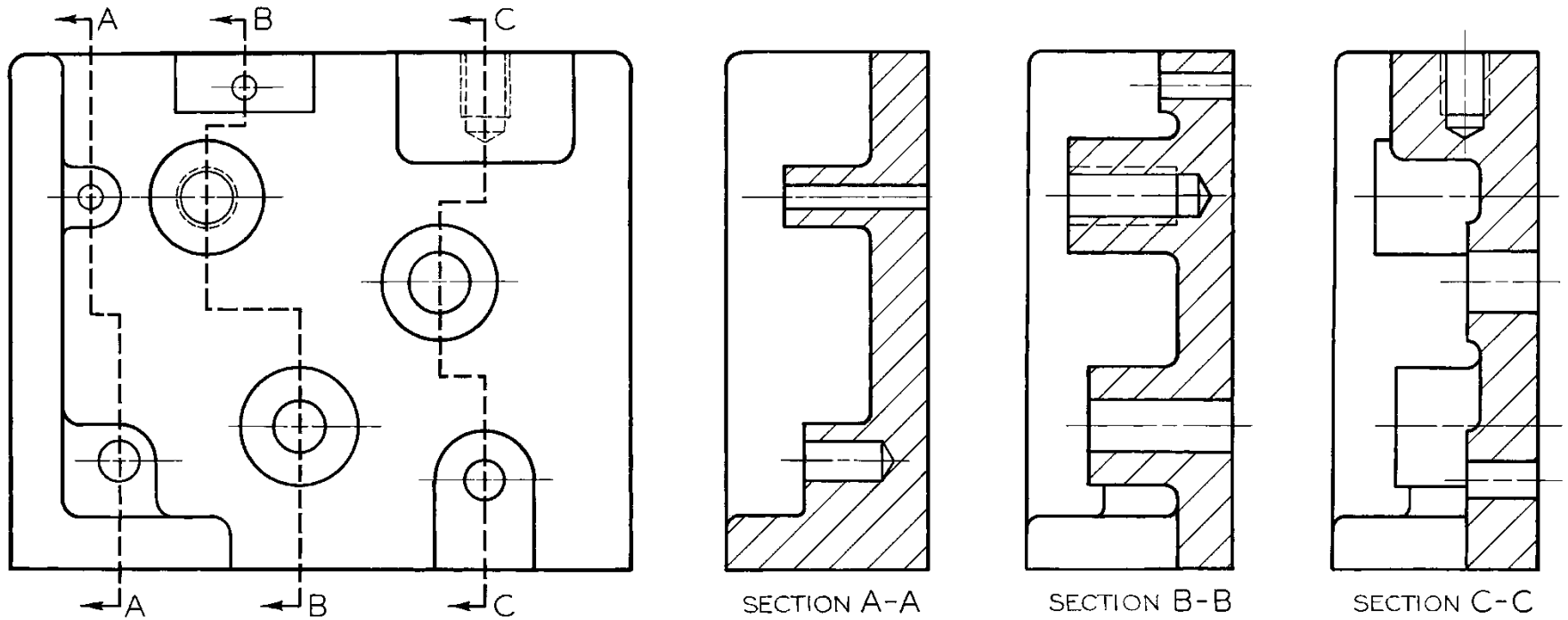


Incorrect  
Avoid changing the direction of the cutting-plane line before it passes through completely.

# Mech 220: 4th LECTURE

## SECTION VIEWS:

**full section views:** *offset cutting plane*

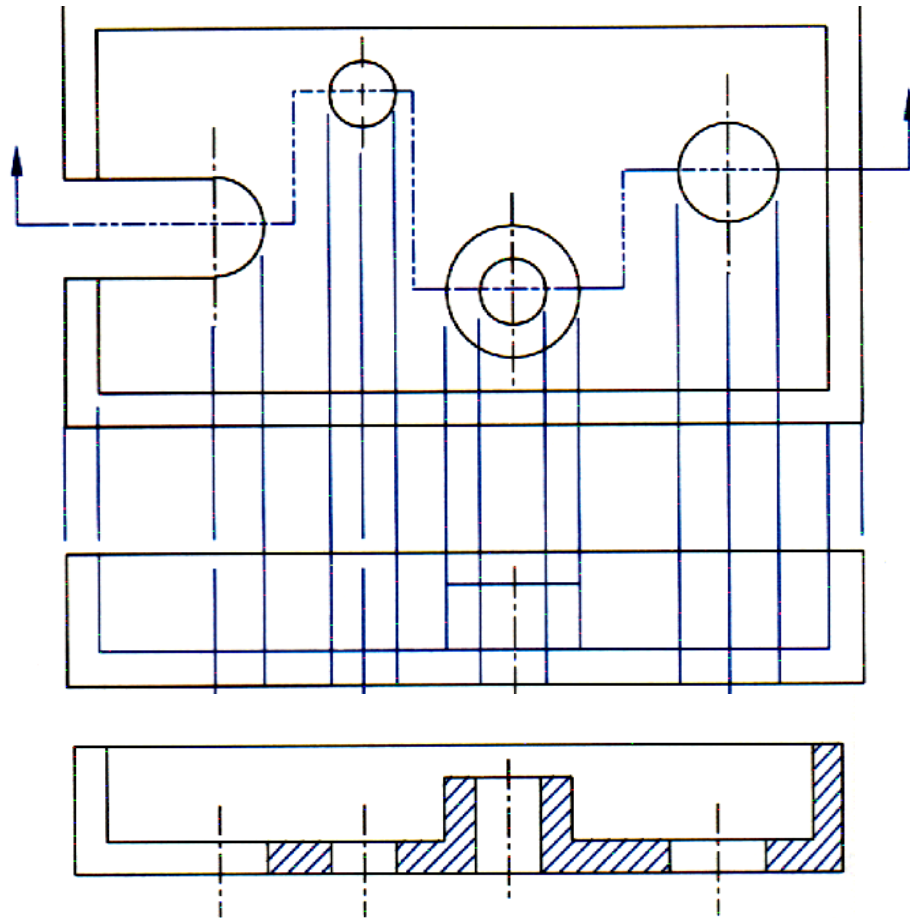


- ◆ Notice the ends of the cutting plane labeled with letters and the sections views neatly arranged and labeled to match.

# Mech 220: 4th LECTURE

## SECTION VIEWS:

full section views: *offset cutting plane*- **How it is done**



- ◆ Step 1: Identify the features that the offset section will path through
- ◆ Step 2: Draw thick cutting plan line passing all the way through the features and the change of line direction is midway between two adjacent features.
- ◆ Step3: When the cutting plane intersects planes along the surface of the part, lines are projected down to form the width.
- ◆ Step 4: Add section or hatch lines identifying the intersection of the object with the cutting plane.
- ◆ Step 5: Add centerlines to complete the view.

# Mech 220: 4th LECTURE

## SECTION VIEWS:

### full section views: *offset* cutting plane

**Drafting Tip #5:**  
cutting plane line  
change of  
direction DOES  
NOT FORM LINES  
on the sectional  
view

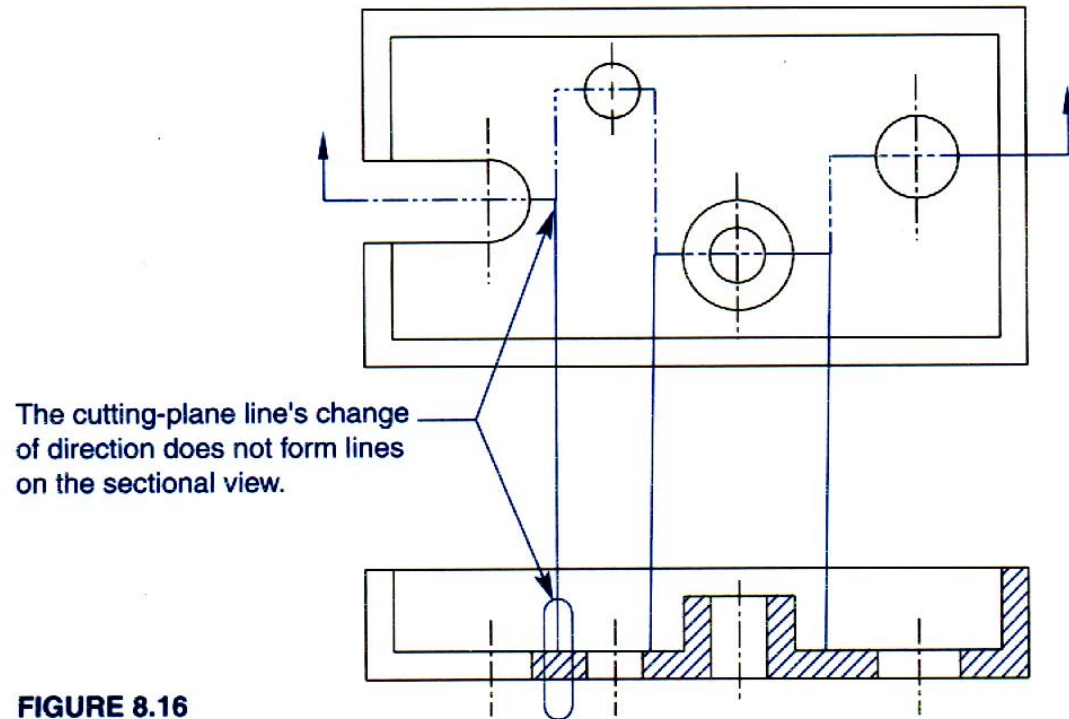


FIGURE 8.16

- ◆ The change in plane direction is not shown on the sectional view, since the cut is purely imaginary and no edge is present on the object at this position.

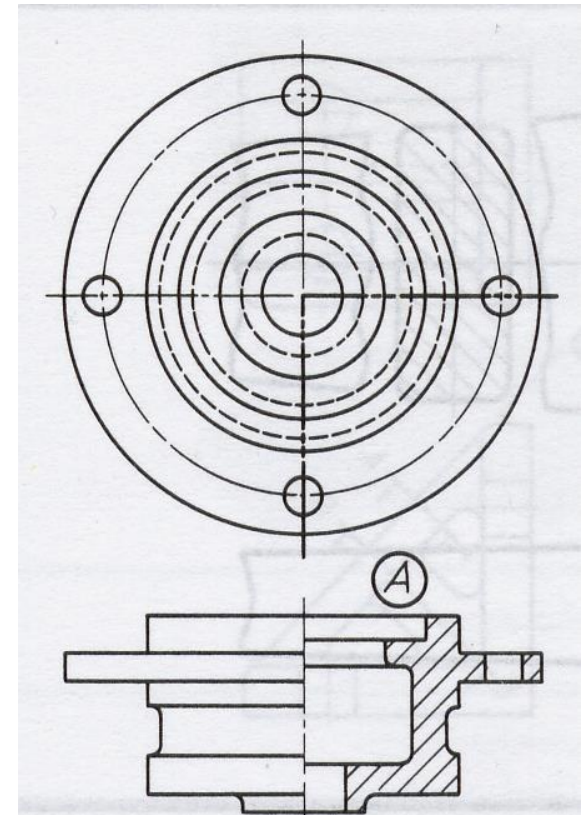
# Mech 220: 4th LECTURE

## SECTION VIEWS:

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### Types of Sectional Views:

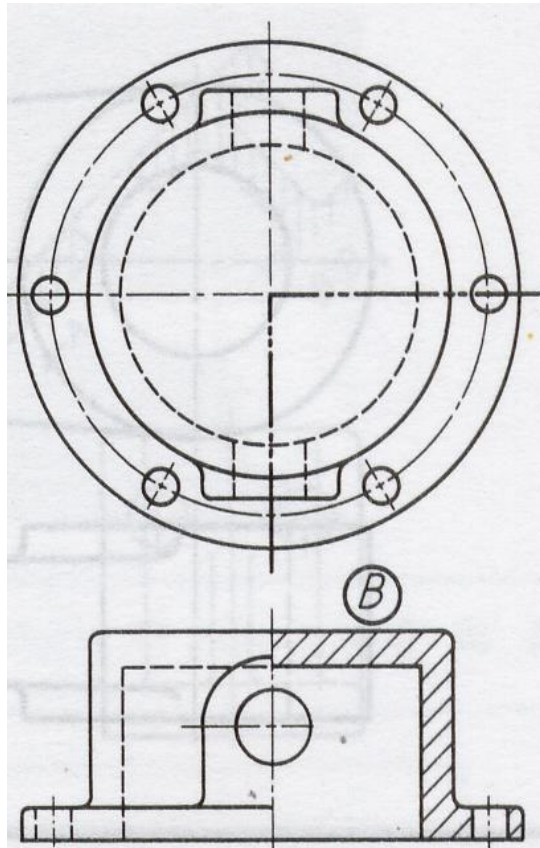
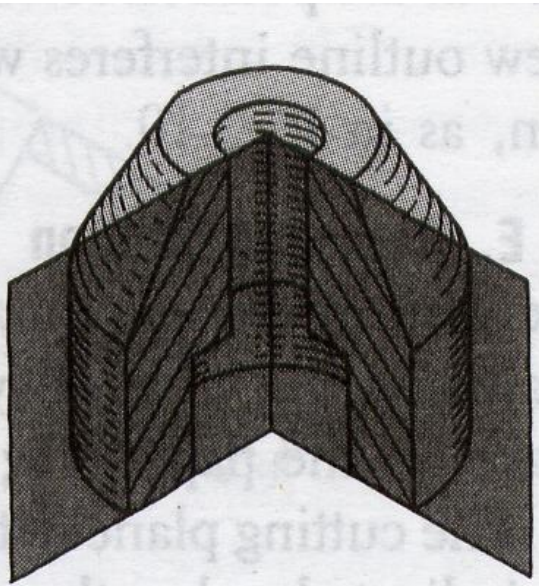
# Half Section View



# Mech 220: 4th LECTURE

## SECTION VIEWS:

### half section views



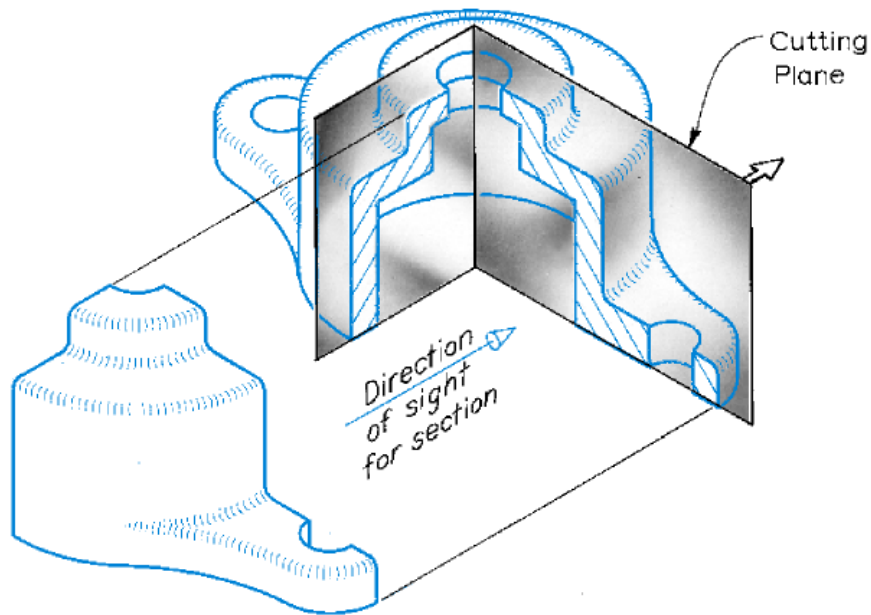
- ◆ Half section view is used for symmetrical objects.
- ◆ Half of the section is drawn as section view and the other half as regular exterior view.
- ◆ The half section has the advantage of showing both the interior and the exterior of the object on one view without using dashed lines.
- ◆ The centerline separates the exterior and the interior portions on the sectional view.



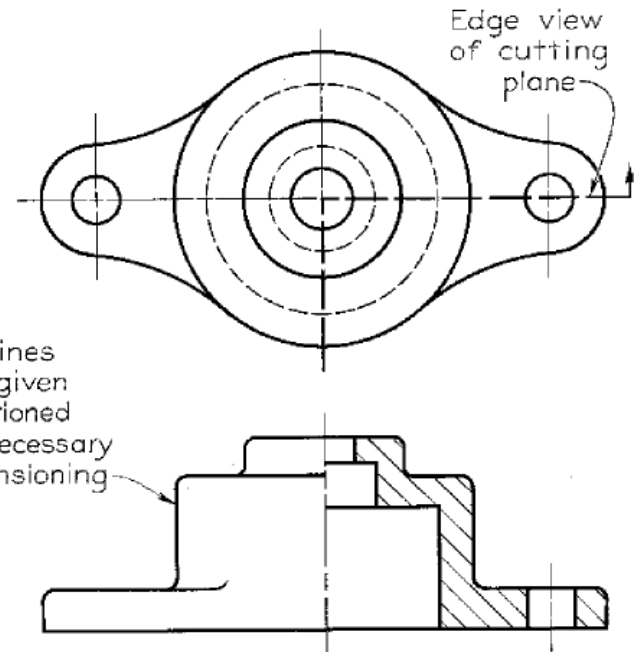
# Mech 220: 4th LECTURE

## SECTION VIEWS:

### Half-Sections



(a) CUTTING PLANE



(b) HALF SECTION

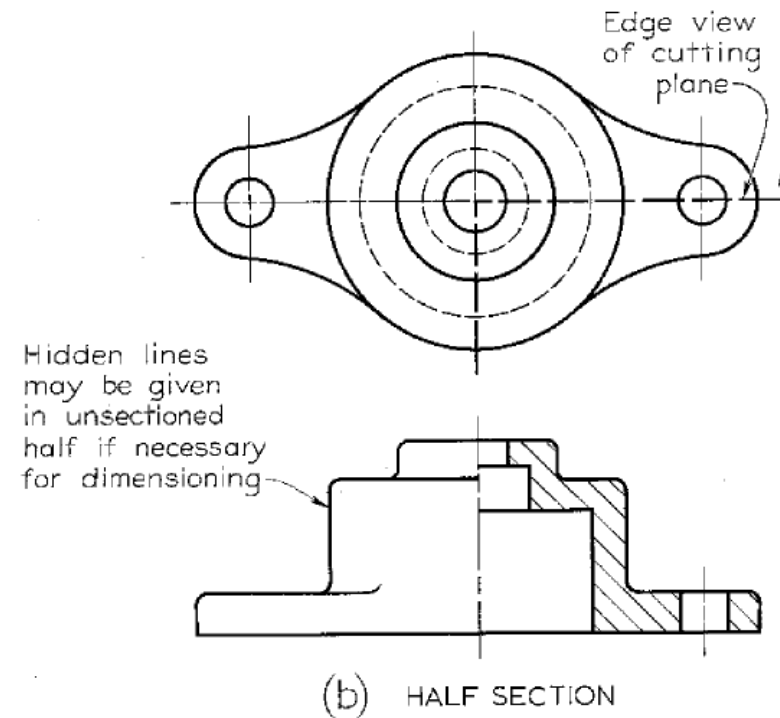
- ◆ Half section forces you to draw and think in two different modes on the same view, so draw each side on itself.
- ◆ Draw the section part of the view using the same technique as in full sectioning.
- ◆ Draw the exterior part of the view using the same technique as in orthographic views.

# Mech 220: 4th LECTURE

## SECTION VIEWS:

### Half Section

- ◆ Rules and steps for generating half section are almost identical to those used for generating full sections
- ◆ What differ full sections from half sections :
  - The cutting plane goes halfway across the object then turns  $90^\circ$  and exits the object
  - Only one arrow is used on the half that is to be cut
  - A half section drawing leaves one side in orthographic form

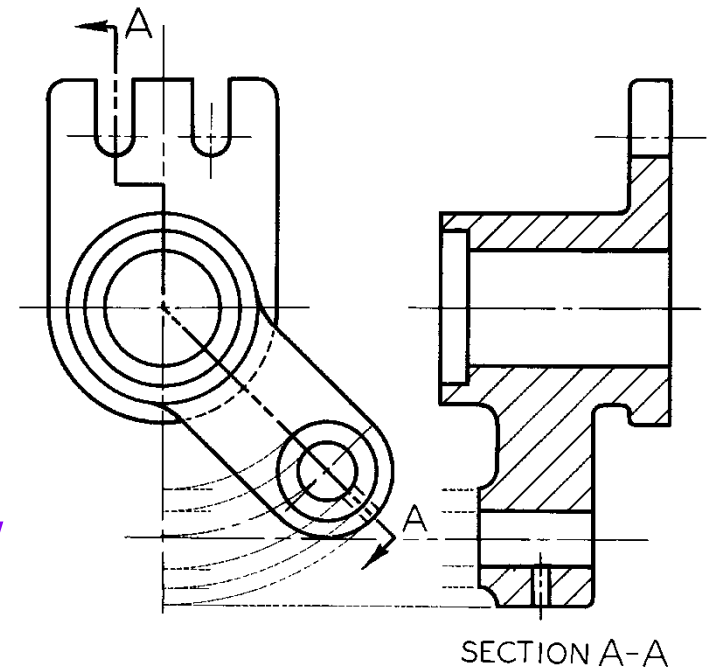


# Mech 220: 4th LECTURE

## SECTION VIEWS:

### Types of Sectional Views:

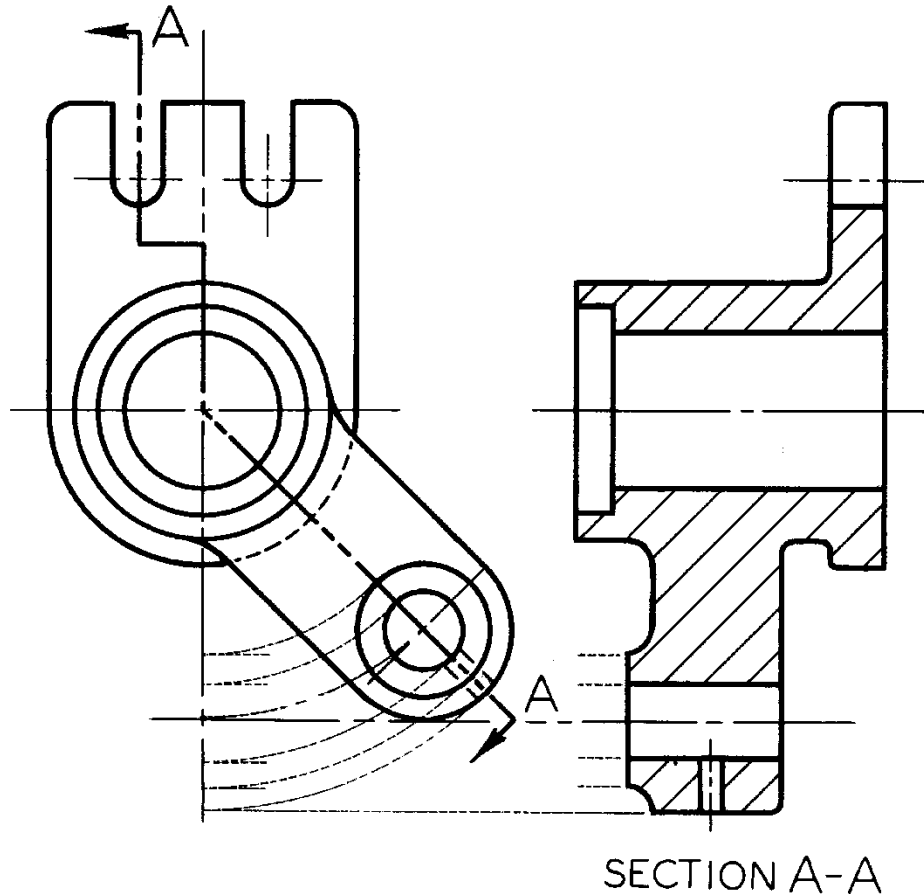
# Aligned section View



# **Mech 220: 4th LECTURE**

## **SECTION VIEWS:**

### **Aligned Sections**

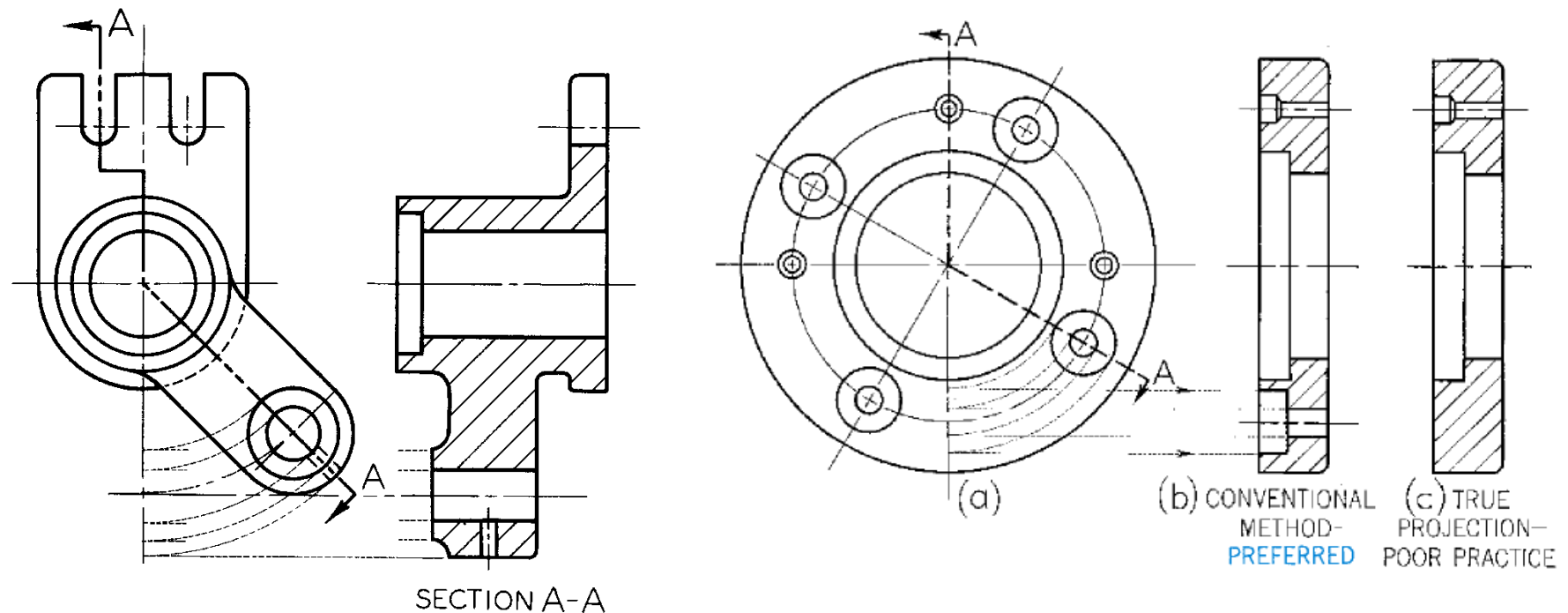


- ◆ Aligned sections use an angled cutting plane to pass through angled features.
- ◆ The plane and feature are then imagined to be revolved into the original plane and the section is projected from there.
- ◆ Some cases aligned section are used in combination with offset section type

# Mech 220: 4th LECTURE

## SECTION VIEWS:

### Examples of Aligned Sections



- ◆ The first part of section is drawn as typical offset sectional view, then the cut plan angles off the center of the main circle to align slicing through area that has more details.
- ◆ Features along the angled cutting plane line are rotated to the new position then projected down to the section view.

# **Mech 220: 4th LECTURE**

## **SECTION VIEWS:**

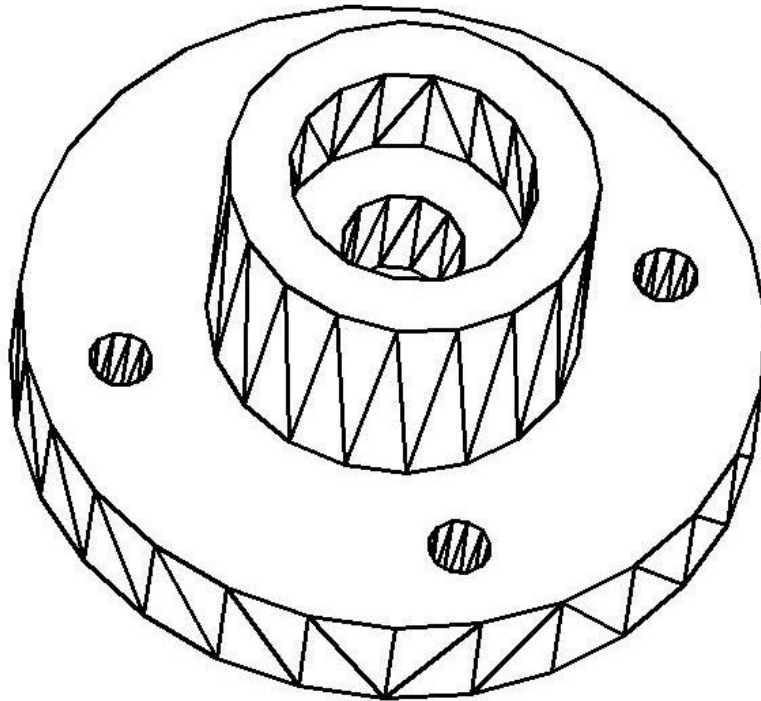
### **Assignment Due Next Week**

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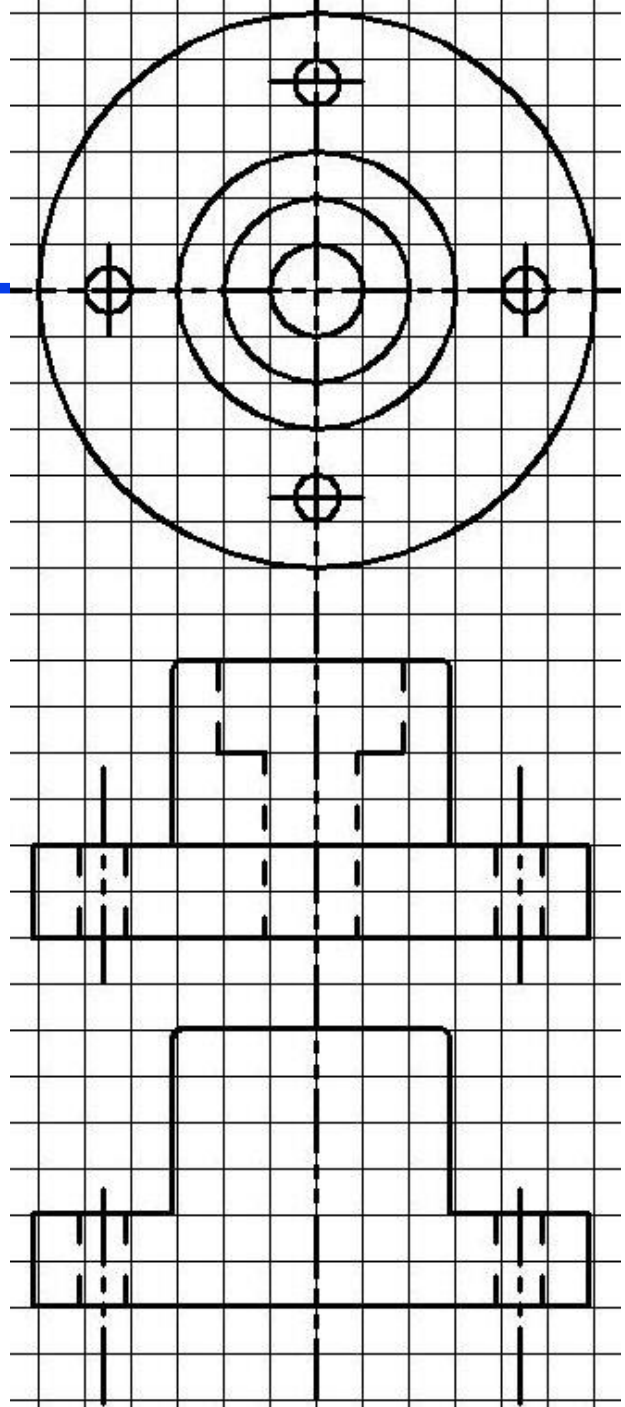
- ◆ **Postd on Moodle**
- ◆ **A grided paper is available in the course file at the Engineering Library**

# Mech 220: 4th LECTURE

## Sketching exercise



**Generate a section view of the model above using the section A-A.**



**Mech 220: 4th LECTURE**  
**SECTION VIEWS:**

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**Thank you**