



**College of Electrical and Mechanical  
Engineering  
Department of Mechanical Engineering**

**Engineering Drawing (MEng2001)**

**Chapter 6: Section Views**

***By Tolina T.***

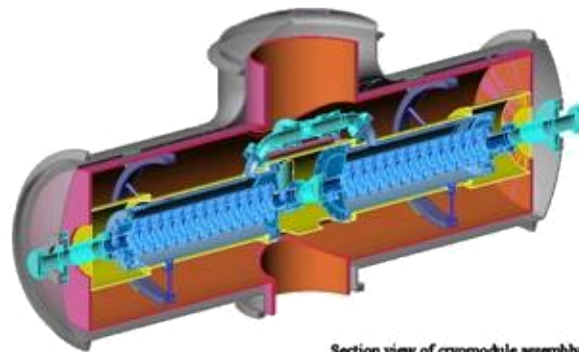
**April, 2022**

## **Upon completion of this chapter students will be able to:**

1. Interpret and visualize engineering drawings, drawing conventions and standards.
2. Construct multi-view drawings or supplement views from real objects or given pictorial drawings using appropriate engineering drawing tool and techniques.
3. Function effectively as an individual and as group member in assignments and course activities.

# Topics

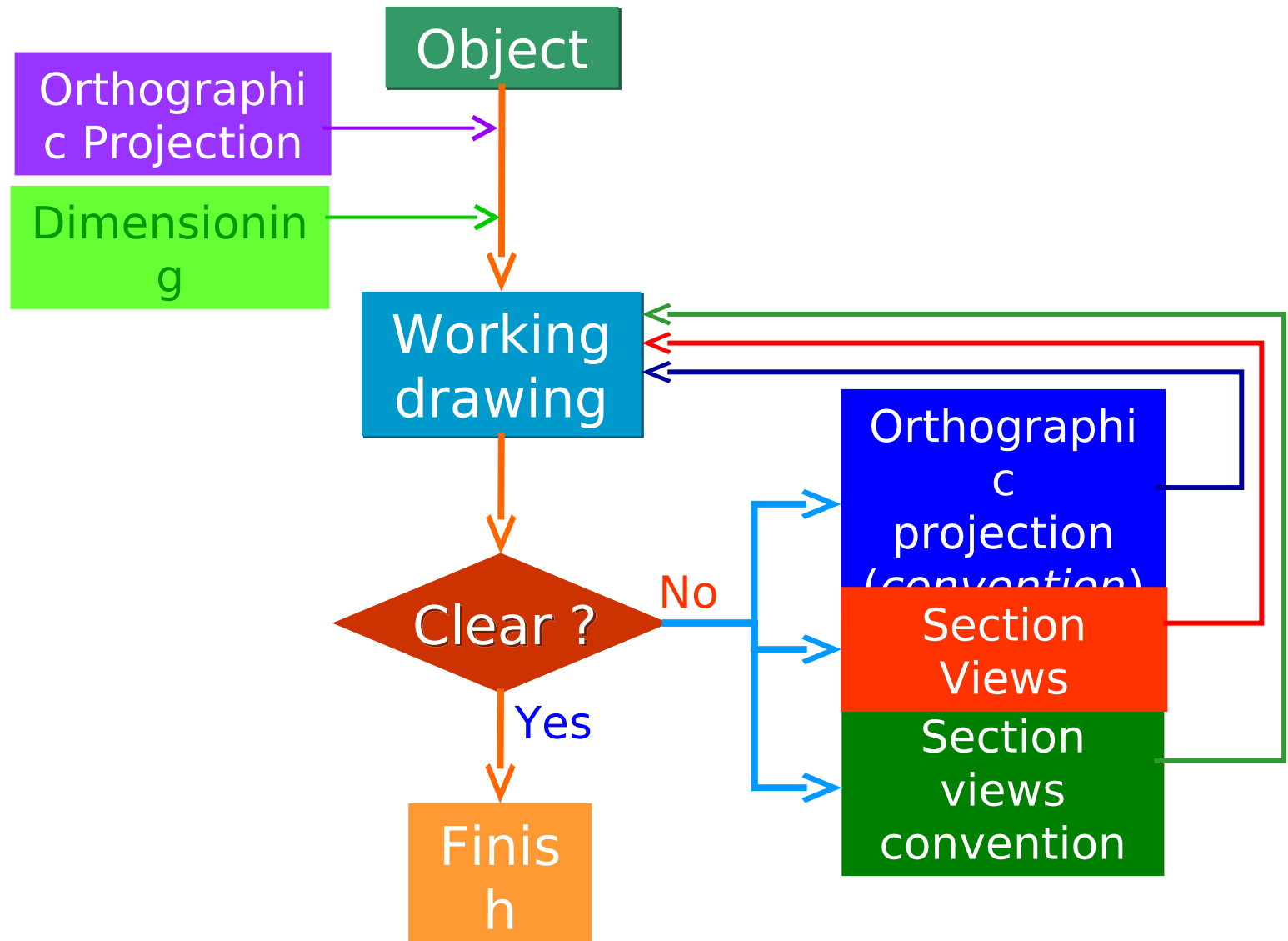
- Introduction
- Terminology & common practices
- Kind of sections
- Section view representation of *rib*, *web*, *spoke* and *lug*.
- Aligned section
- Conventional break



Section view of cryomodule assembly.



# Graphics Communication with Engineering Drawing

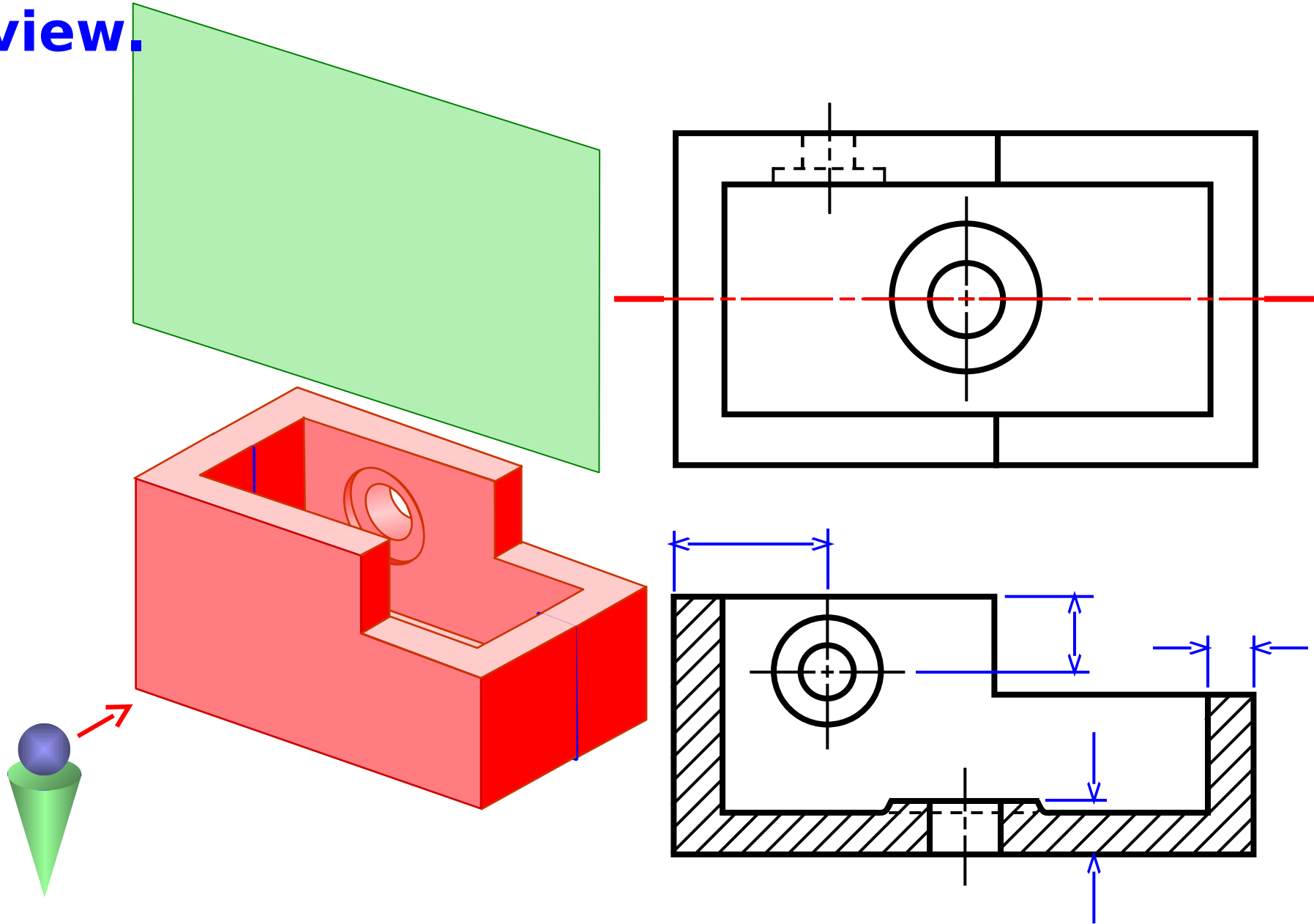


# Purposes of Section Views

- Clarify the views by
  - ❖ reducing or eliminating the hidden lines
  - ❖ revealing the cross sectional's shape.
- Facilitate the dimensioning.

**Let See the  
example**

# EXAMPLE : Advantage of using a section view.



# *Terminology and common practices*



# Cutting Plane

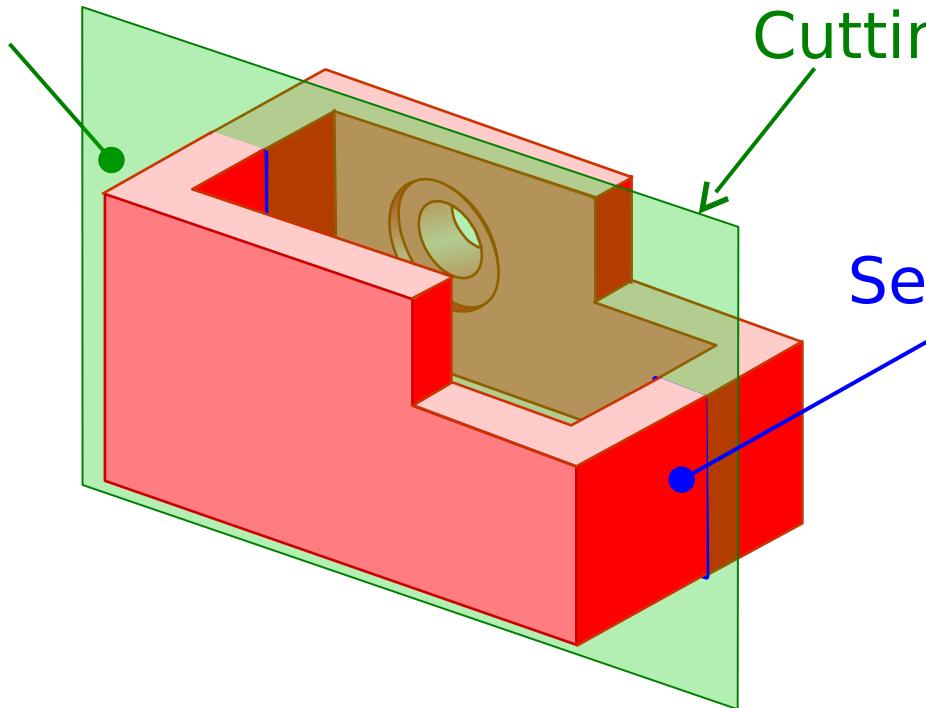
***Cutting plane*** is a plane that ***imaginarily cuts***

the object to reveal the internal features.

Cutting  
plane

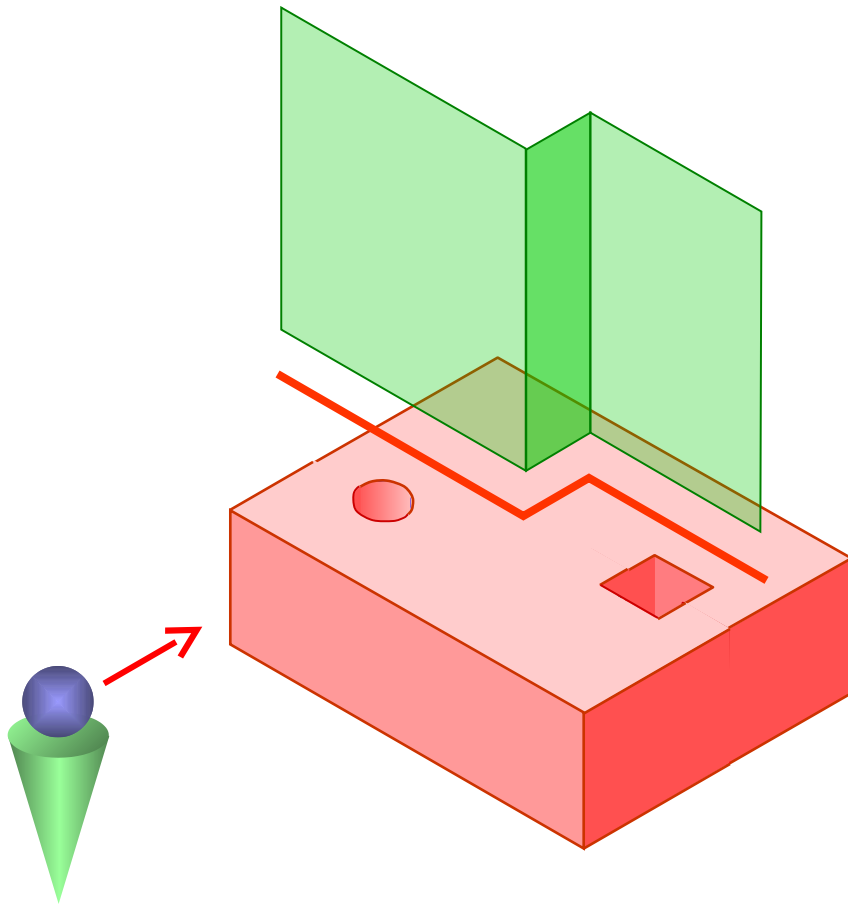
Cutting plane line

Section lines

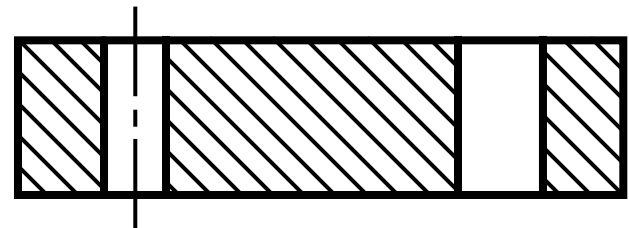
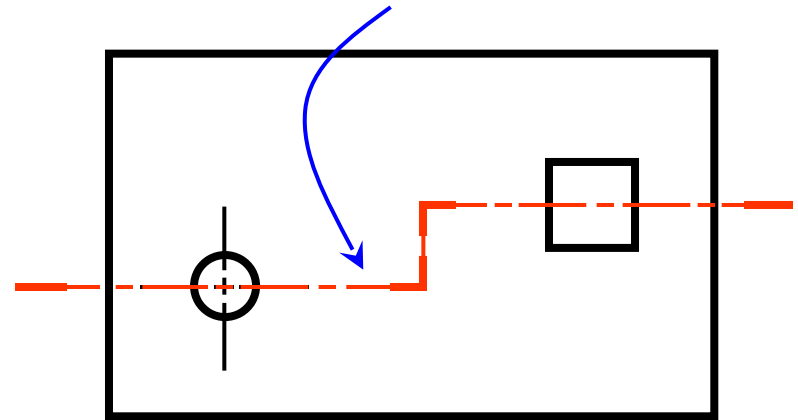


# Cutting Plane Line

***Cutting plane line*** is an ***edge view*** of the cutting plane.

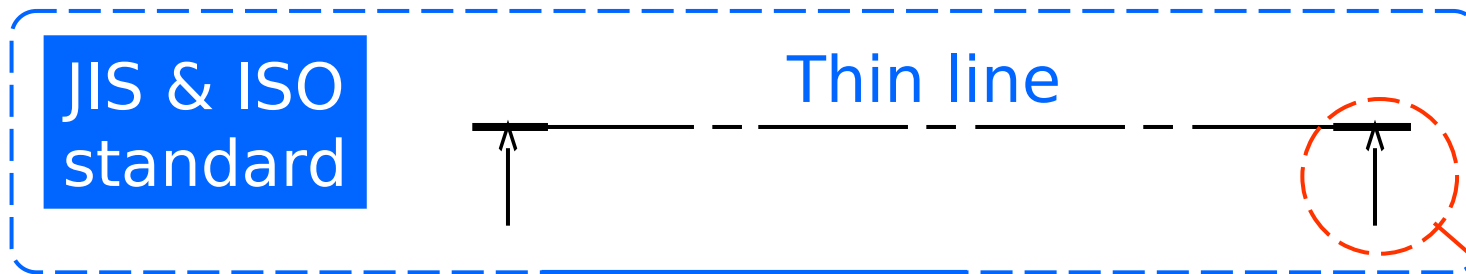
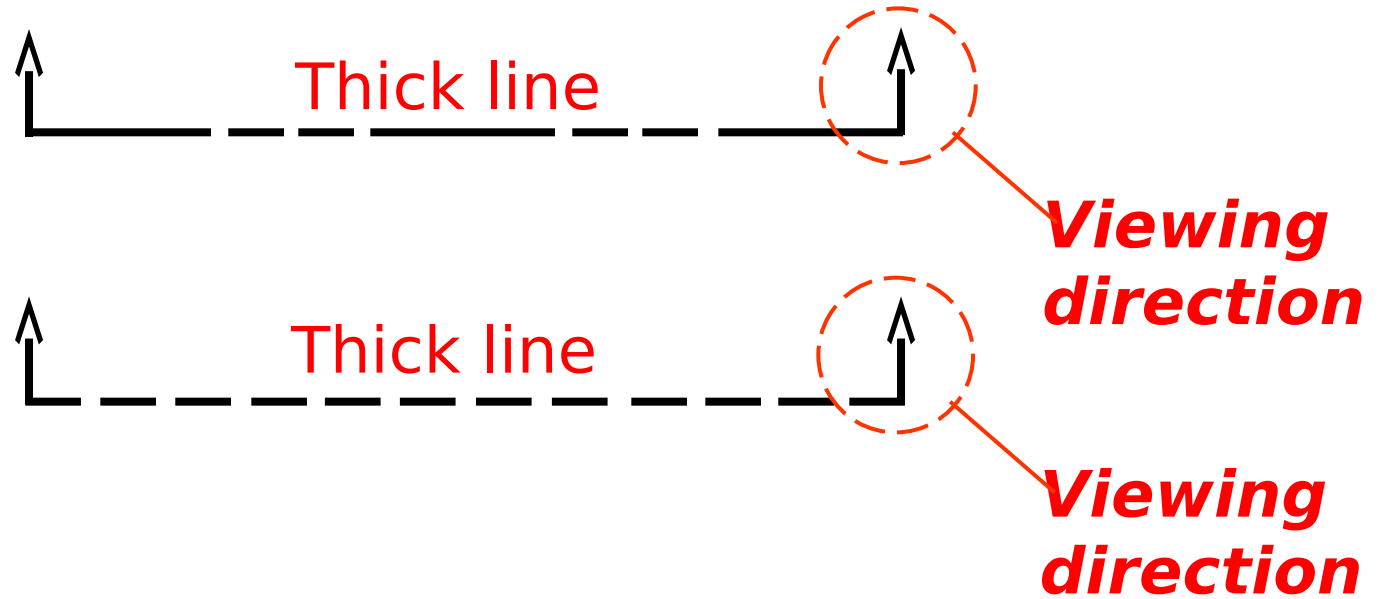


Indicate the ***path*** of cutting plane.



# Cutting Plane Line Styles

ANSI  
standard



This  
course

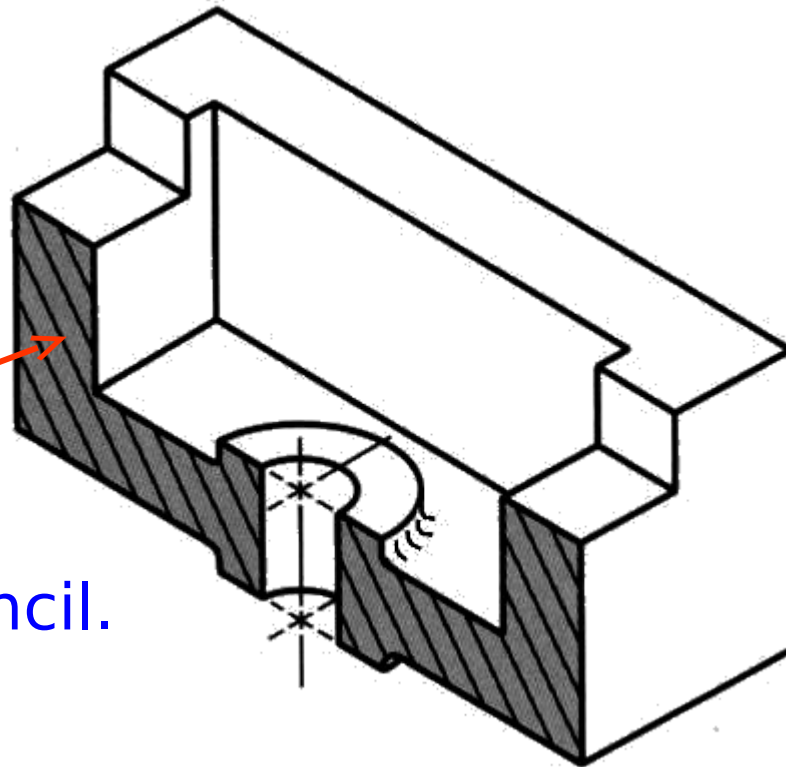
Viewing  
direction

# Section Lines

***Section lines*** or ***cross-hatch lines*** are used to *indicate the surfaces that are cut by the cutting plane.*

***Section  
lines***

Drawn with **4H** pencil.



# Section Lines Symbols

- The section lines are different for each of material's type.
- For practical purpose, the cast iron symbol is used most often for any materials.



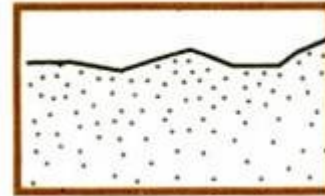
Cast iron,  
Malleable iron



Steel



Concrete



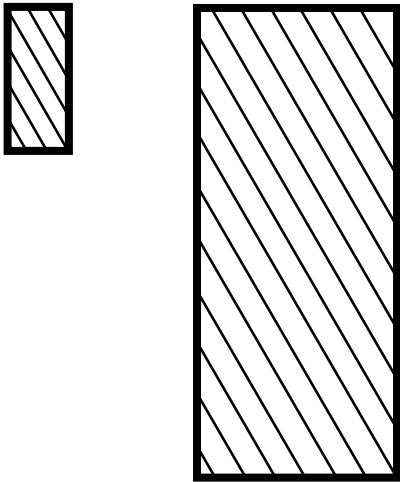
Sand



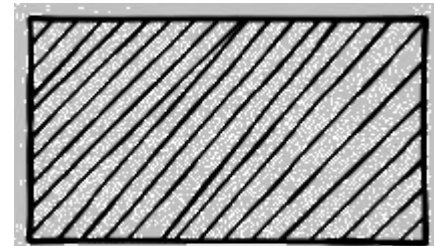
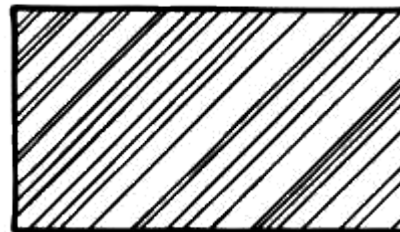
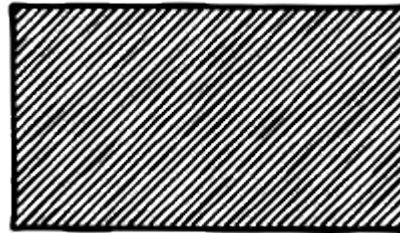
Wood

# Section Lining Practice

The spaces between lines may vary from 1.5 mm for small sections to 3 mm for large sections.



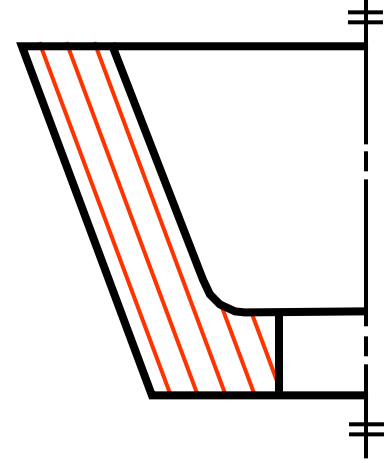
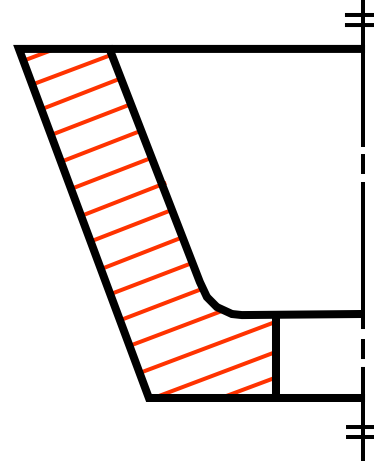
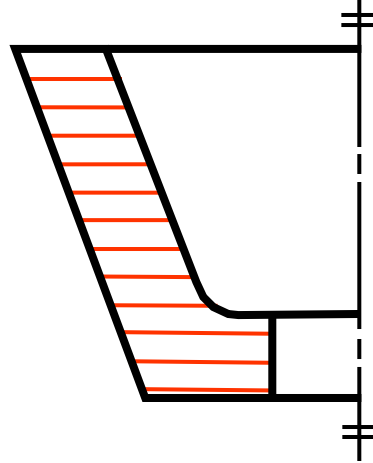
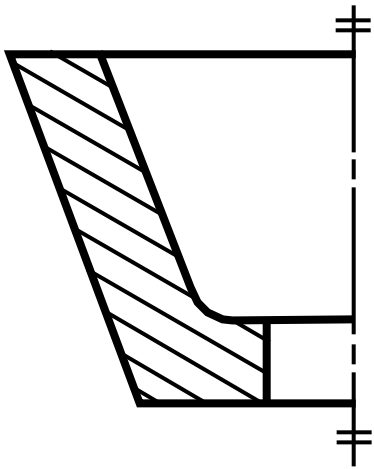
## COMMON MISTAKE



# Section Lining Practice

- It ***should not*** be drawn *parallel* or *perpendicular* to contour of the view.

## COMMON MISTAKE



# *Kinds of Sections*

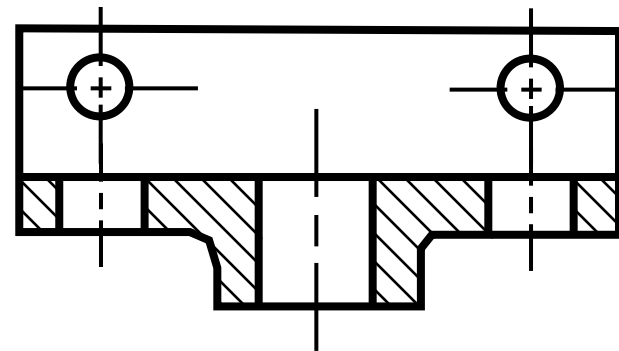
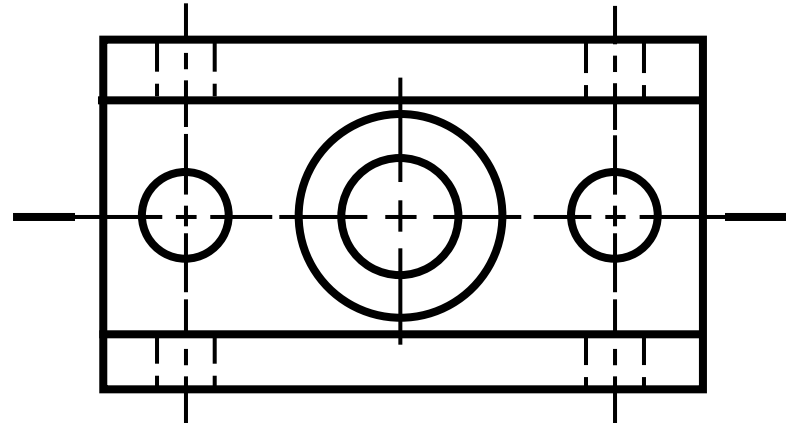
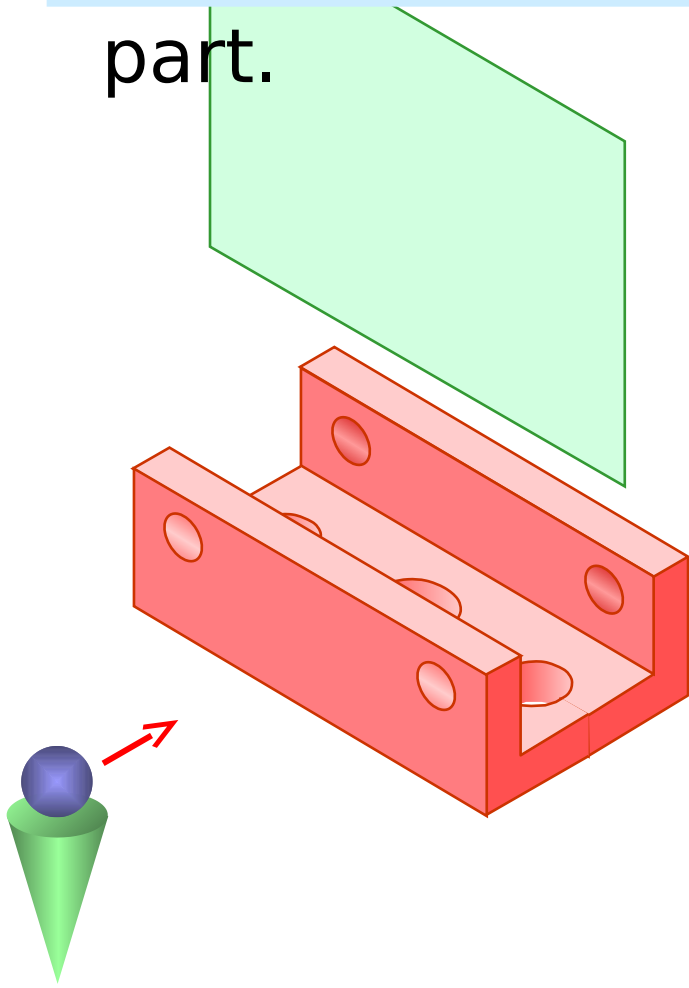


# Kind Of Sections

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

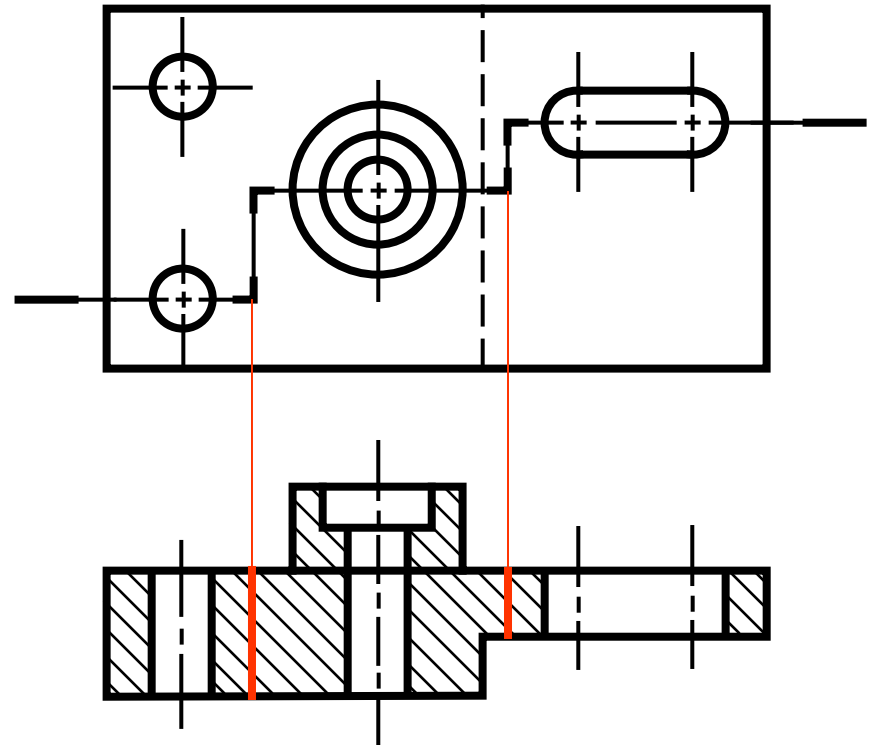
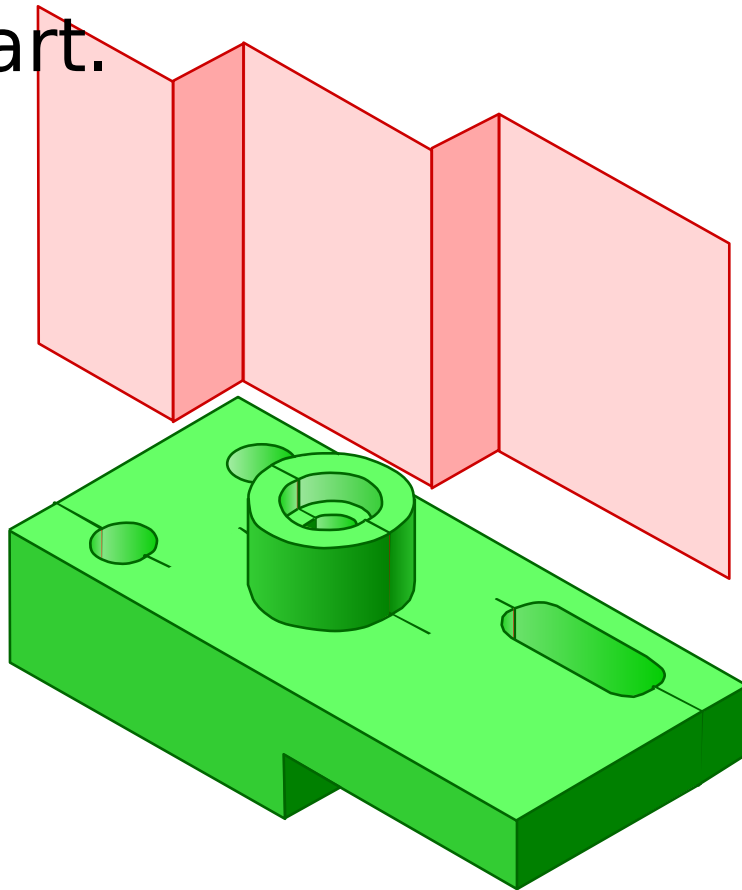
# Full Section View

The view is made by passing the **straight** cutting plane **completely through** the part.



# Offset Section View

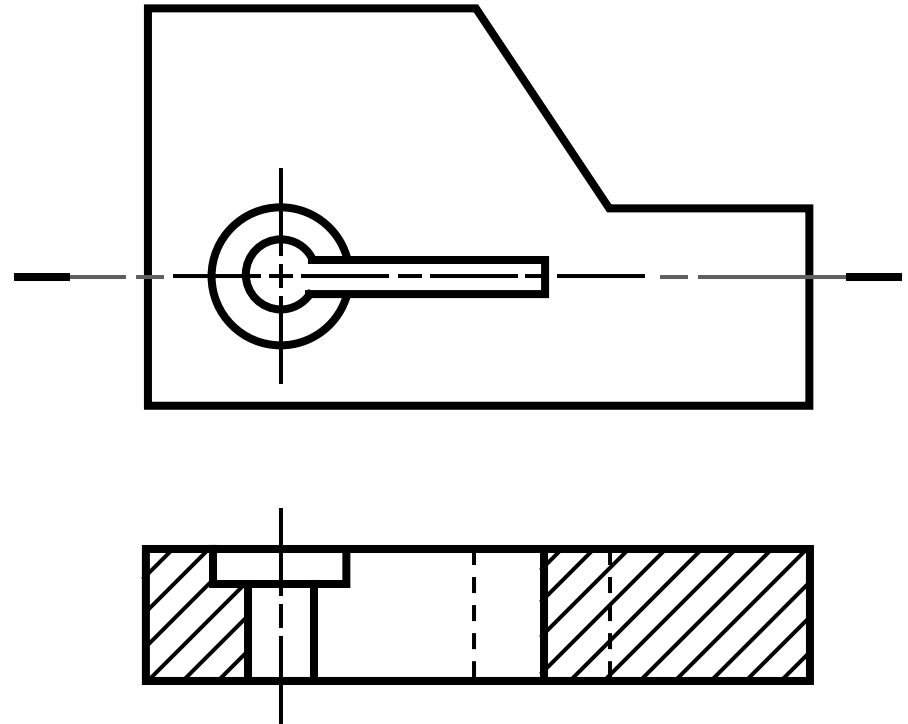
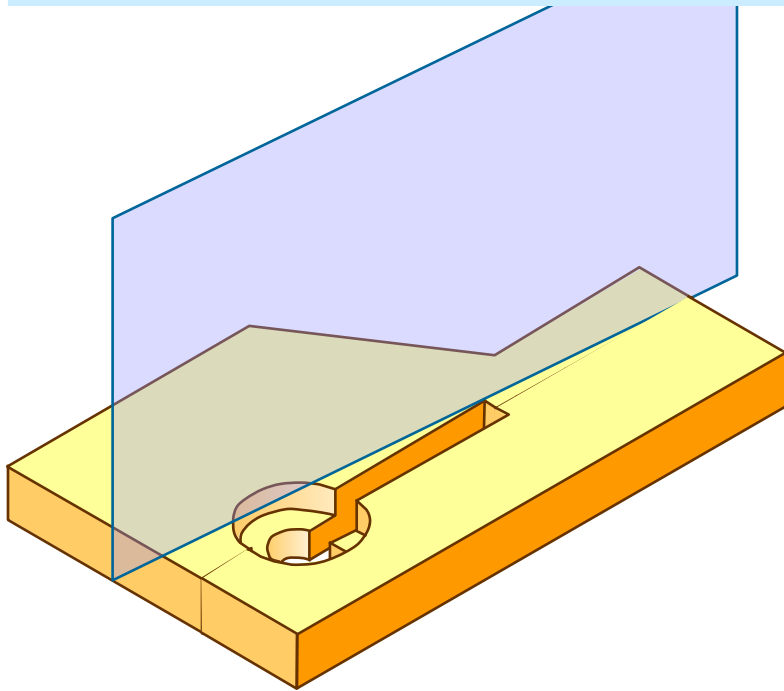
The view is made by passing the **bended** cutting plane **completely through** the part.



**Do not** show the edge views of the cutting plane.

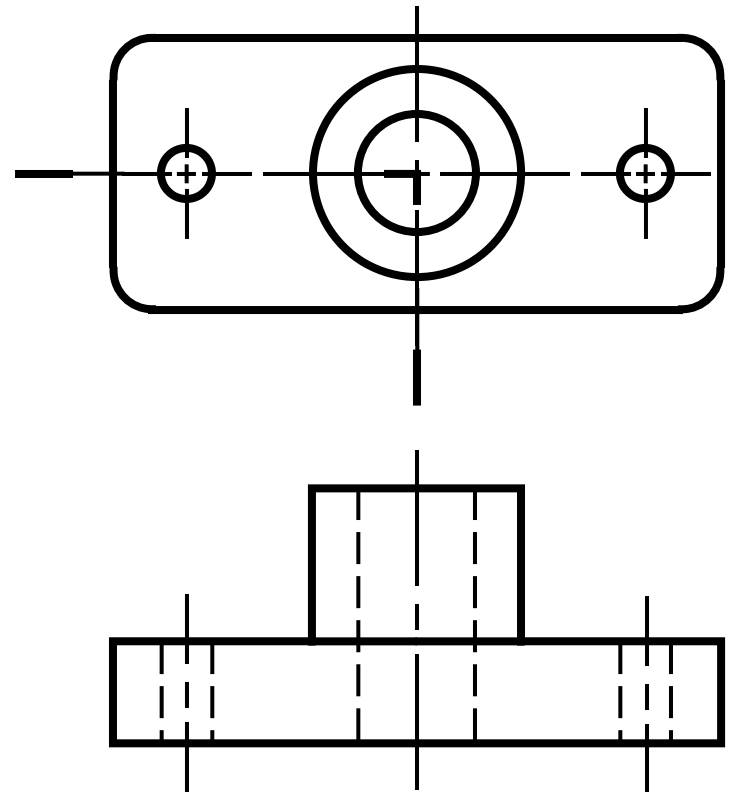
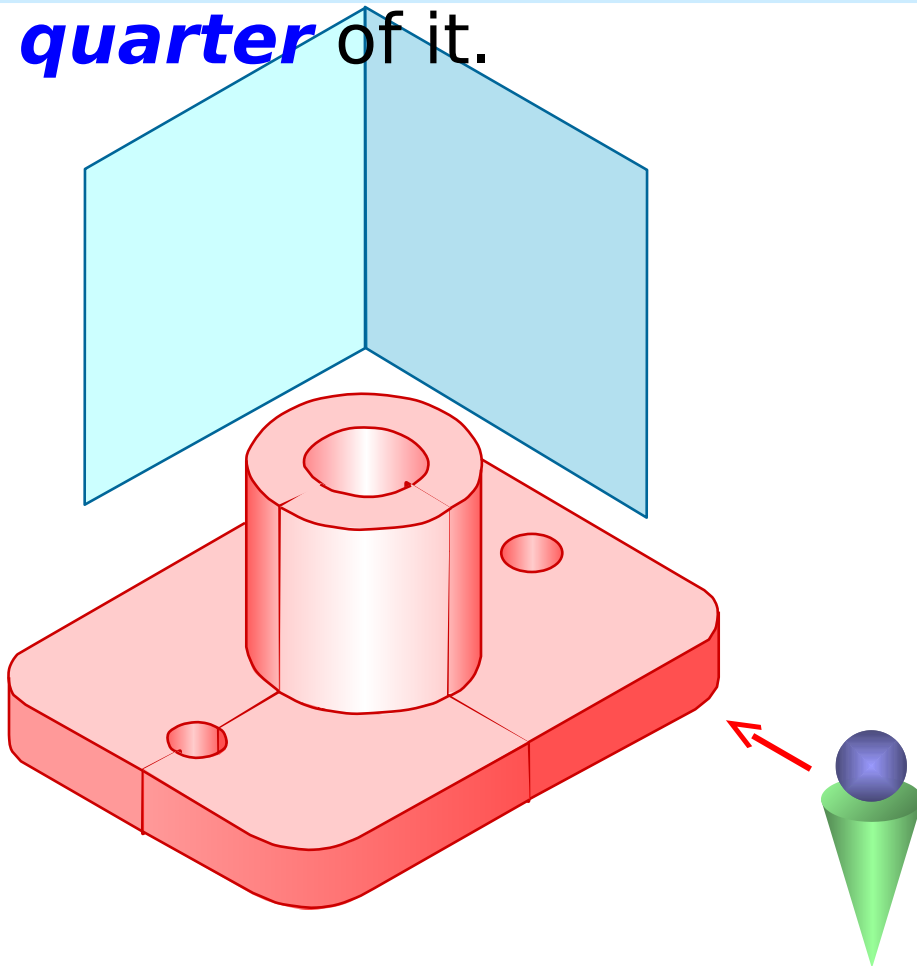
# Treatment of Hidden Lines

Hidden lines are ***normally omitted*** from section views.



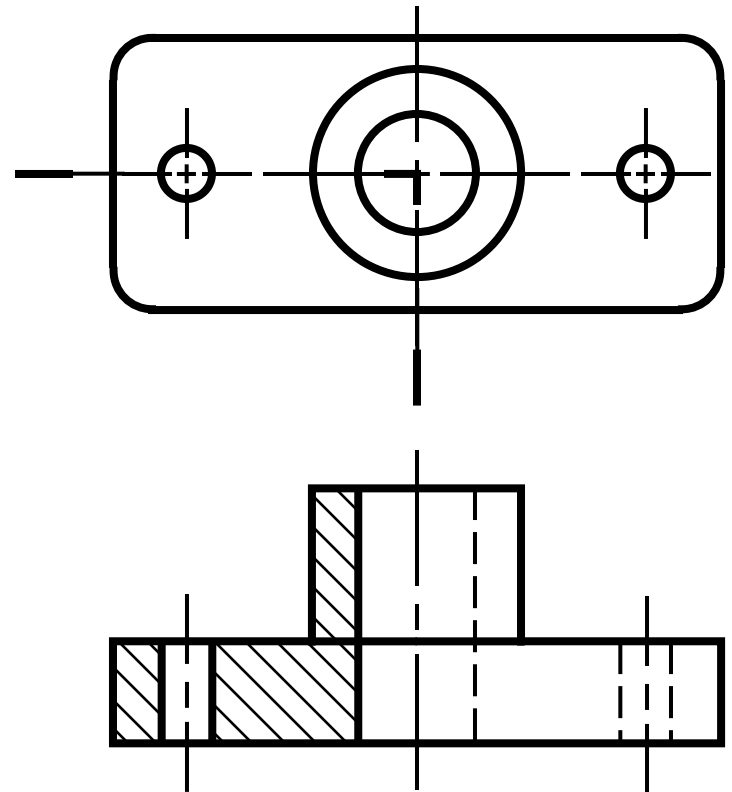
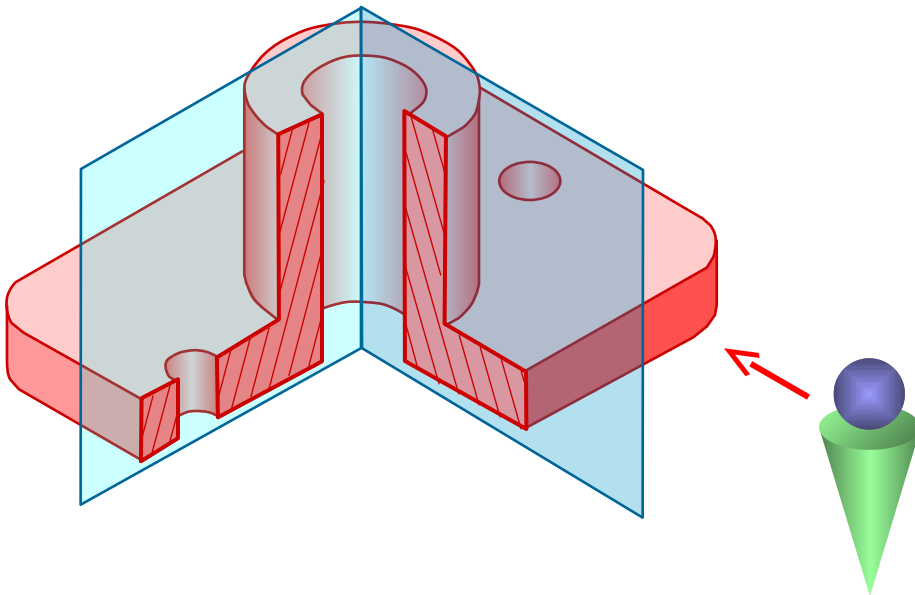
# Half Section View

The view is made by passing the cutting plane **halfway** through an object and remove a **quarter** of it.



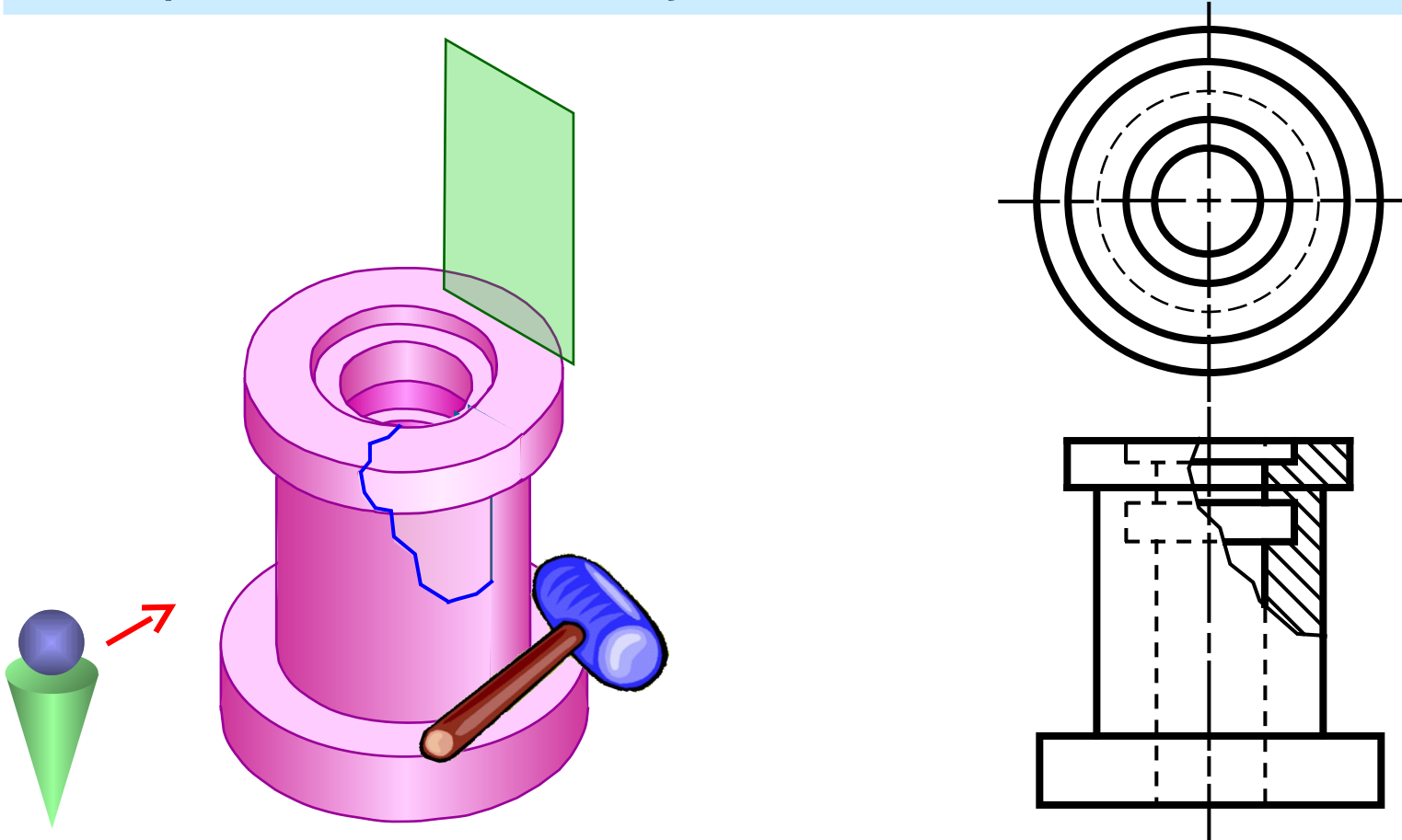
# Half Section View

- A **center line** is used to separate the sectioned half from the unsectioned half of the view.
- **Hidden line** is omitted in unsection half of the view.



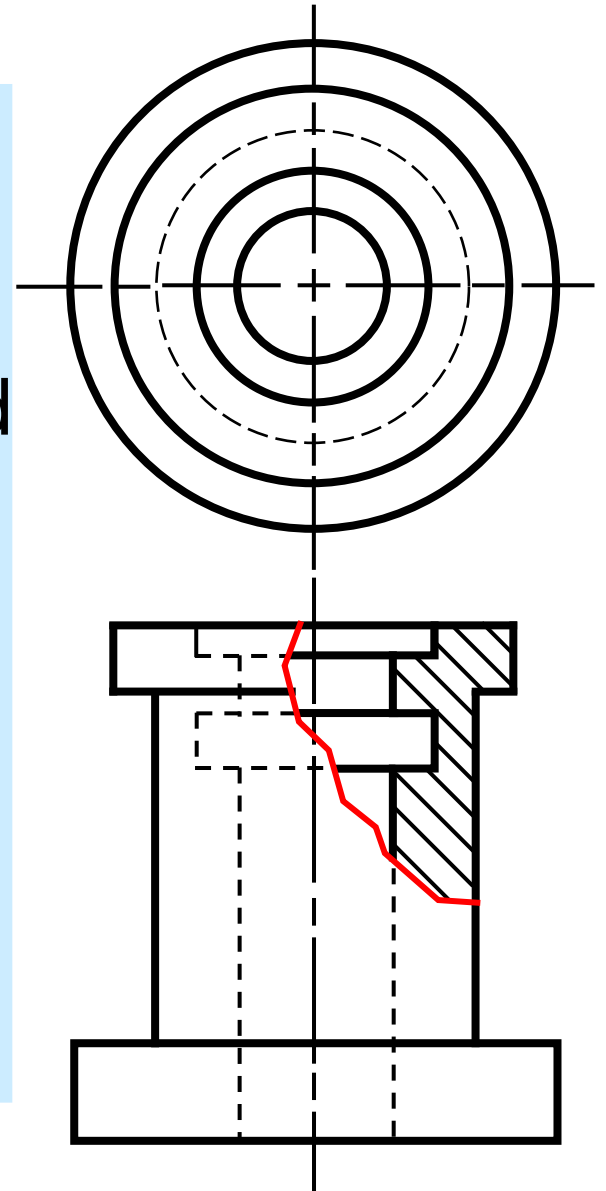
# Broken-out Section View

The view is made by passing the cutting plane normal to the viewing direction and removing the portion of an object in front of it.

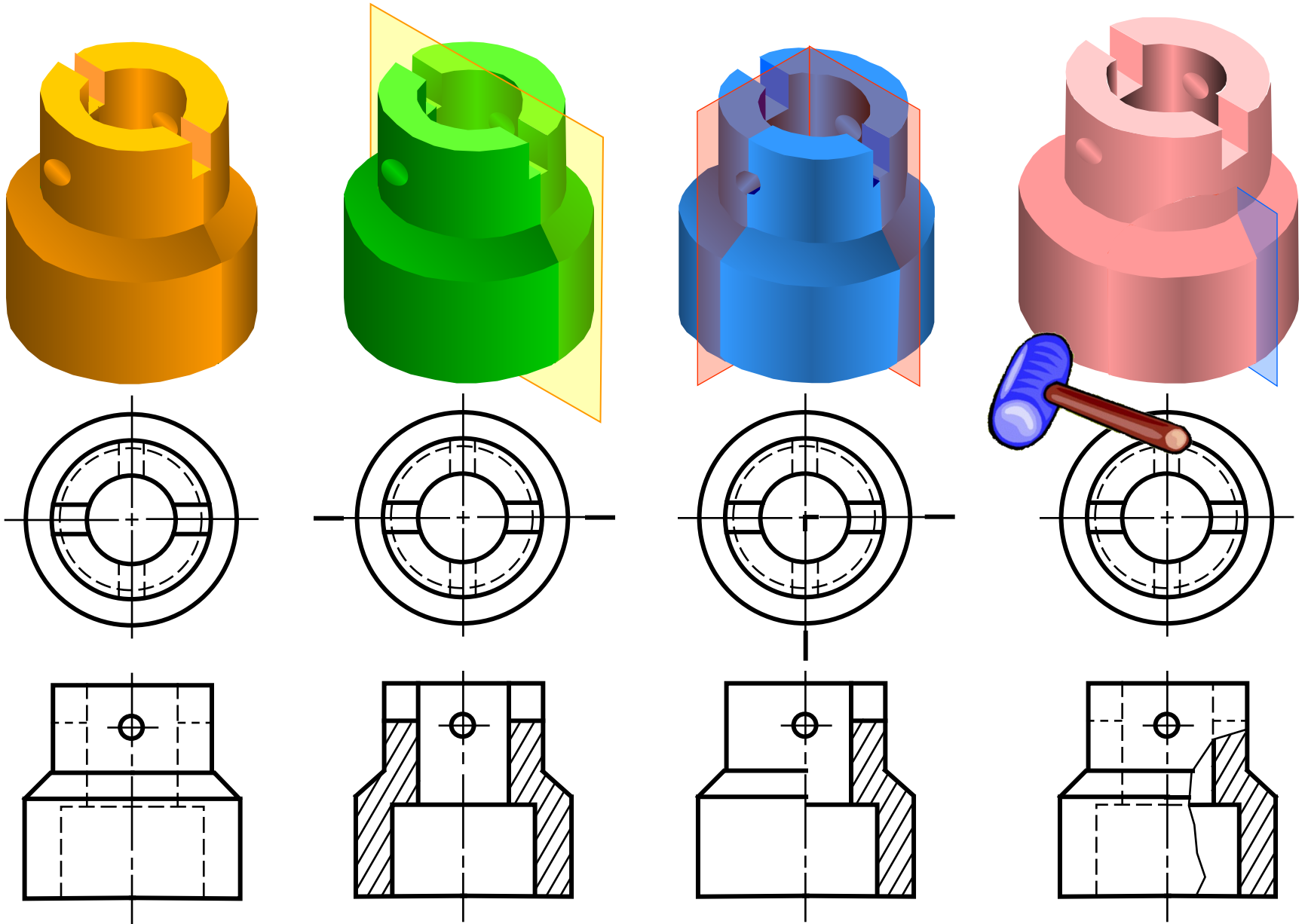


# Broken-out Section View

- A **break line** is used to separate the sectioned portion from the unsectioned portion of the view.
- Break line is a thin continuous line (**4H**) and is drawn freehand.
- There is **no** cutting plane line.



# EXAMPLE : Comparison among several section technique

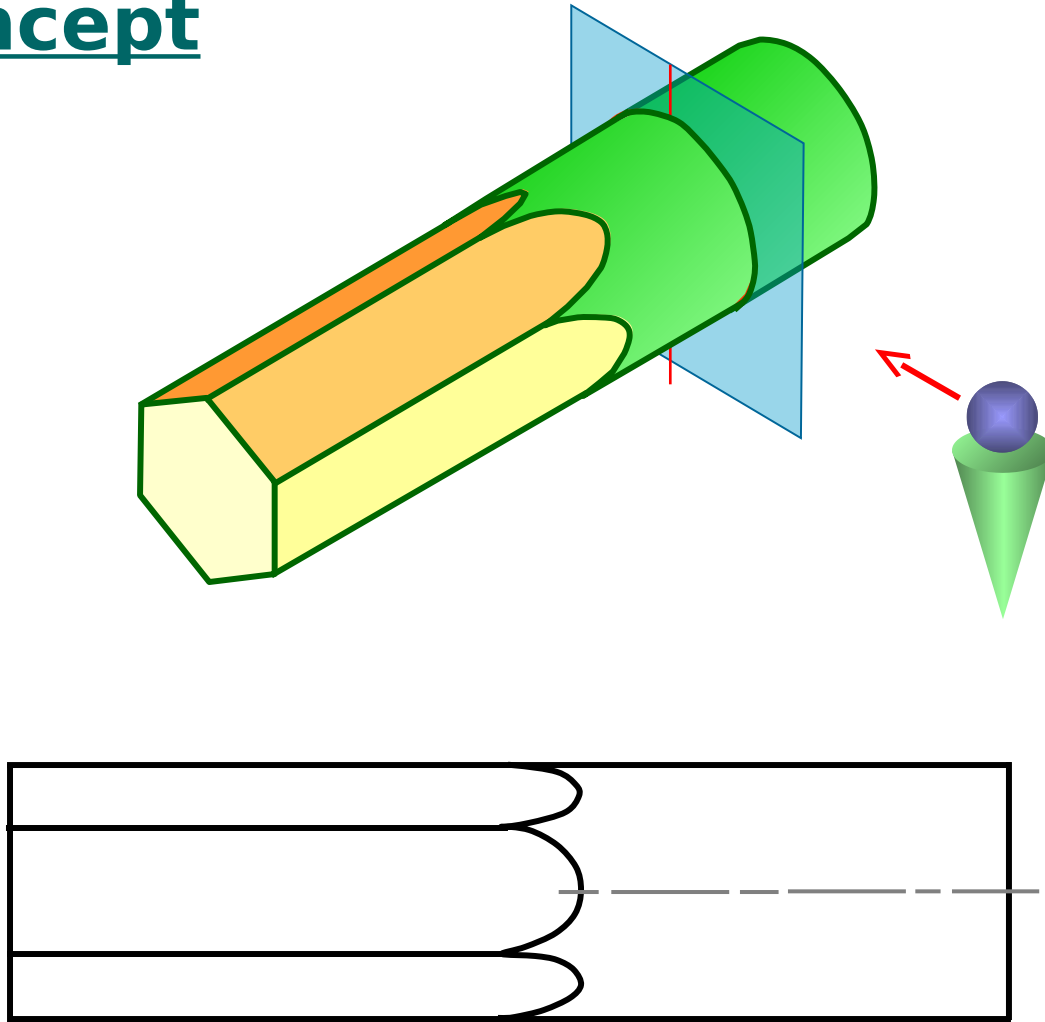


# Revolved Section View

- Revolved sections *show cross-sectional features* of a part.
- No need for additional orthographic views.
- This section is especially helpful when a cross-section varies.

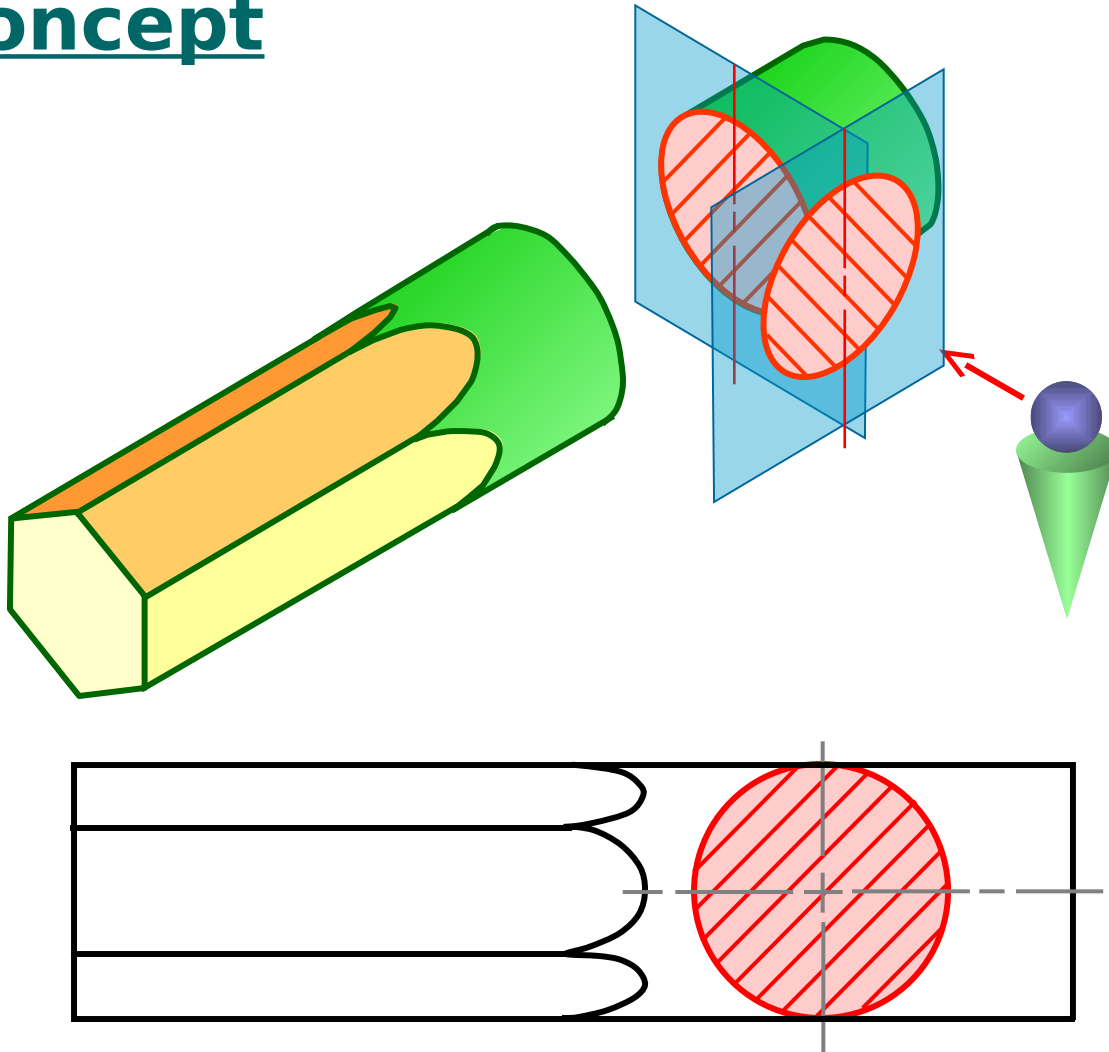
# Revolved Section View

## Basic concept



# Revolved Section View

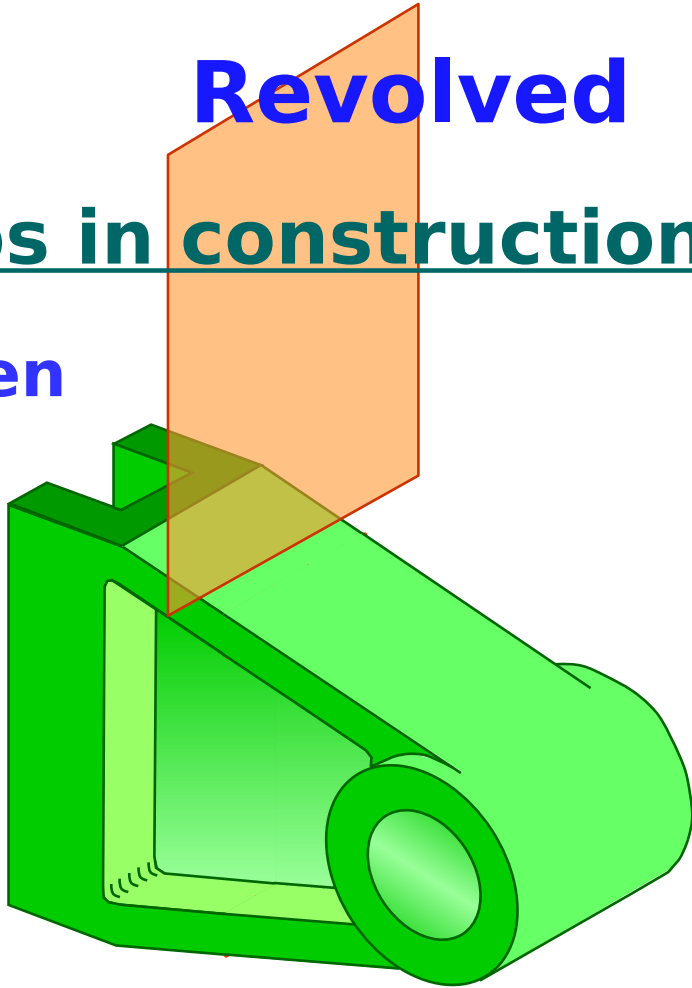
## Basic concept



# Revolved Section View

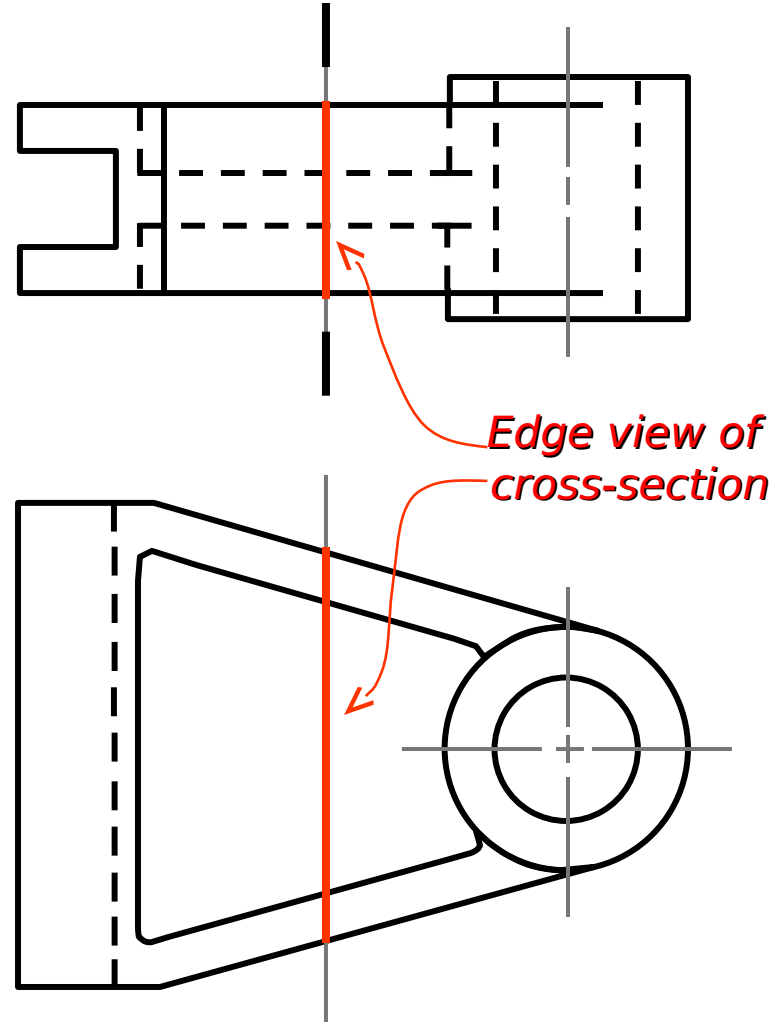
## Steps in construction

Given



### Step 1

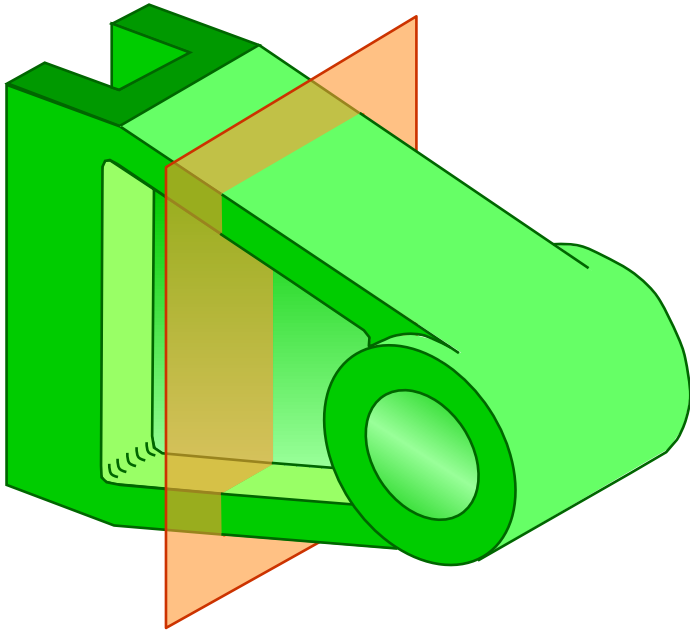
a. Assign position of cutting plane.  
b. Draw axis of rotation in front view.



# Revolved Section View

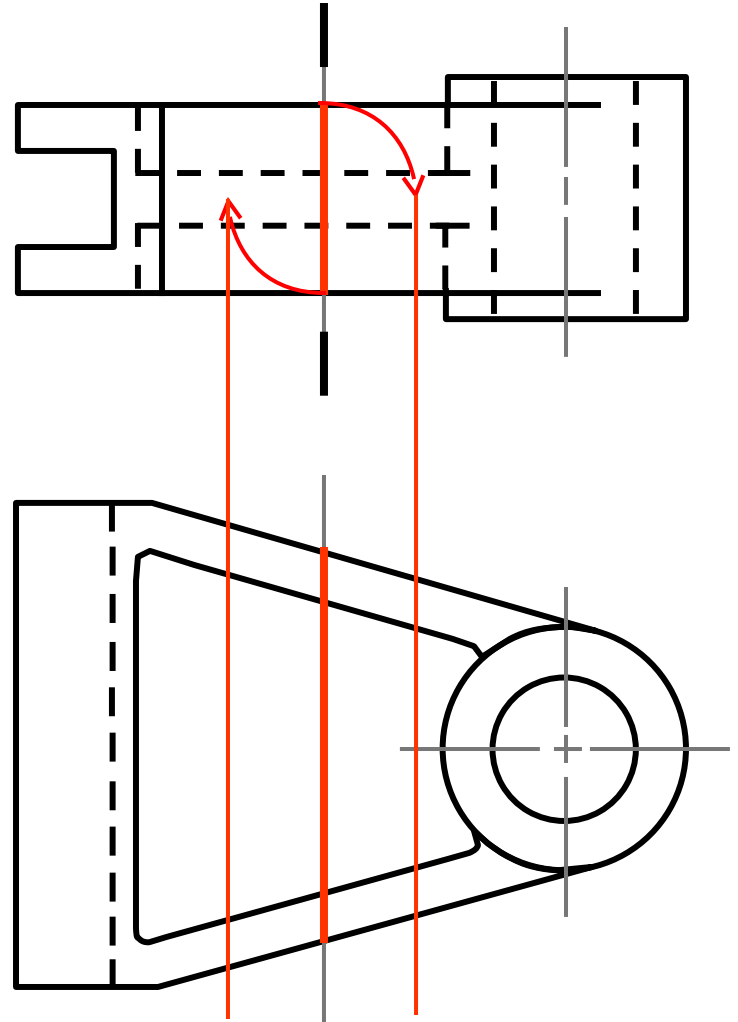
## Steps in construction

**Given**



## **Step 2**

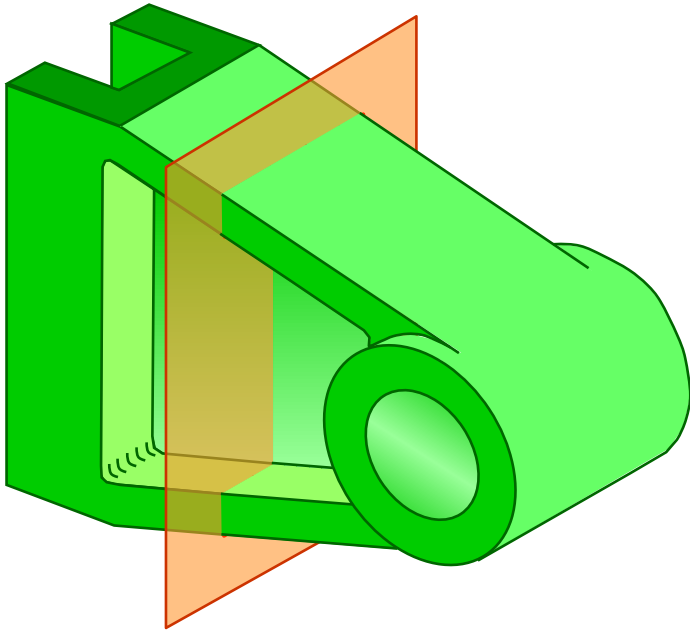
**a. Transfer the depth dimension to the front view.**



# Revolved Section View

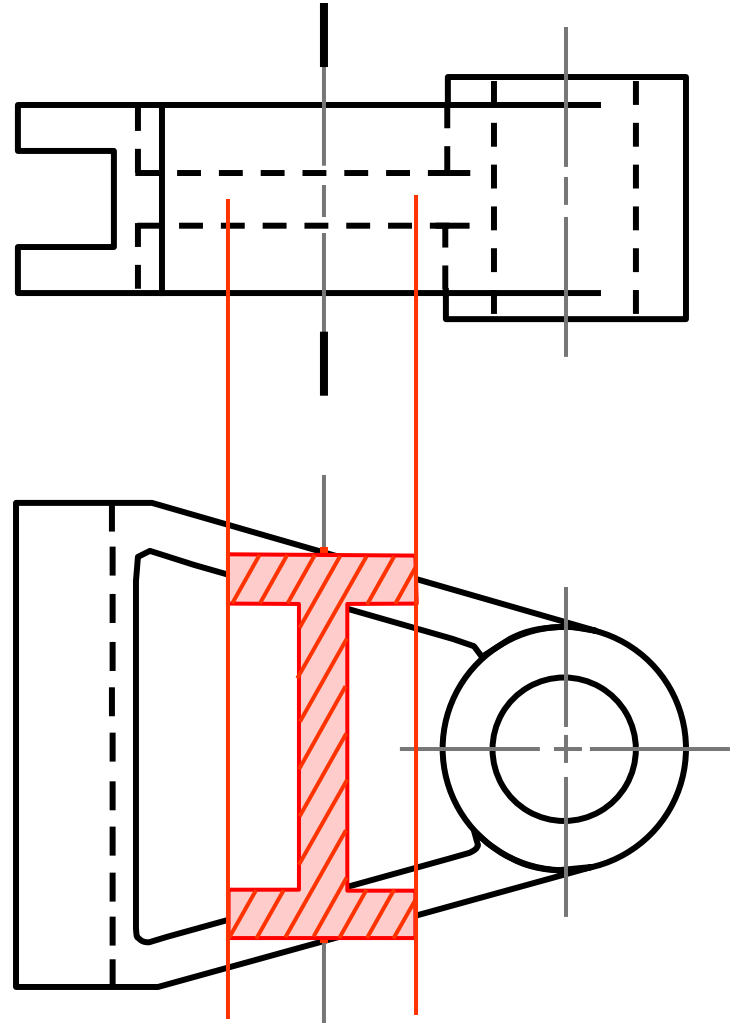
## Steps in construction

**Given**



**Step 3**

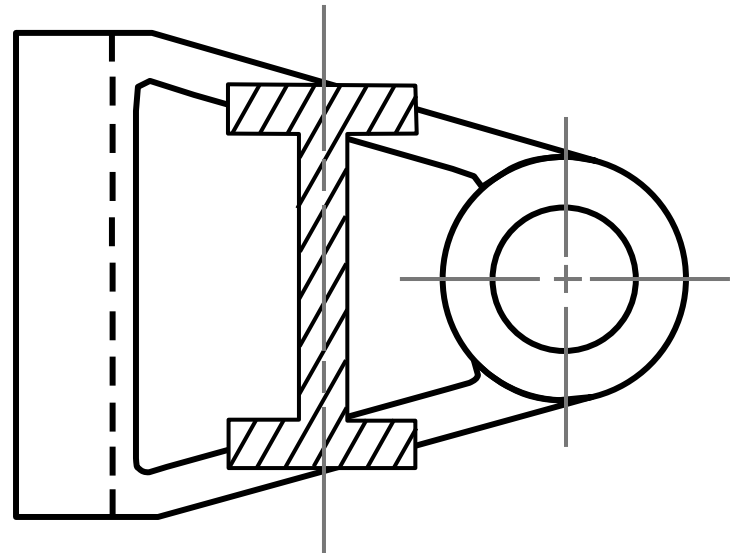
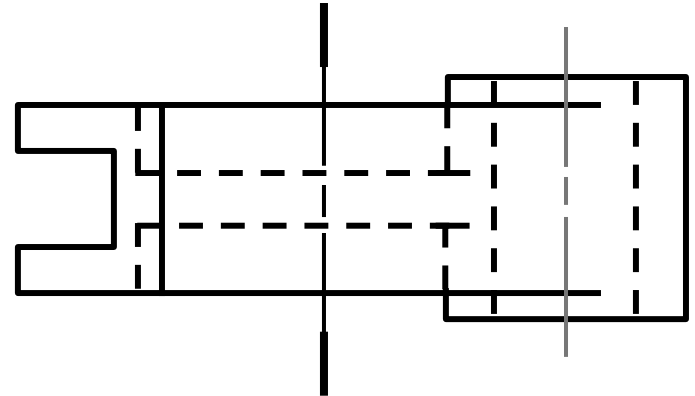
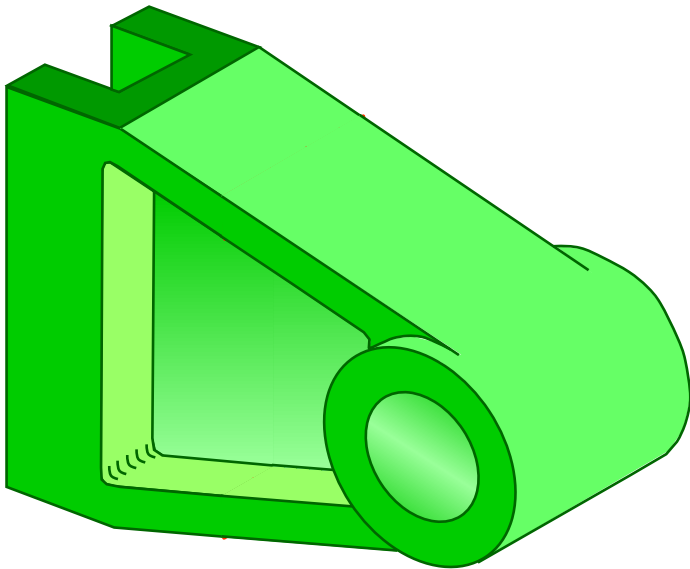
- a. Draw the revolved section lines.



# Revolved Section View

## Steps in construction

Given

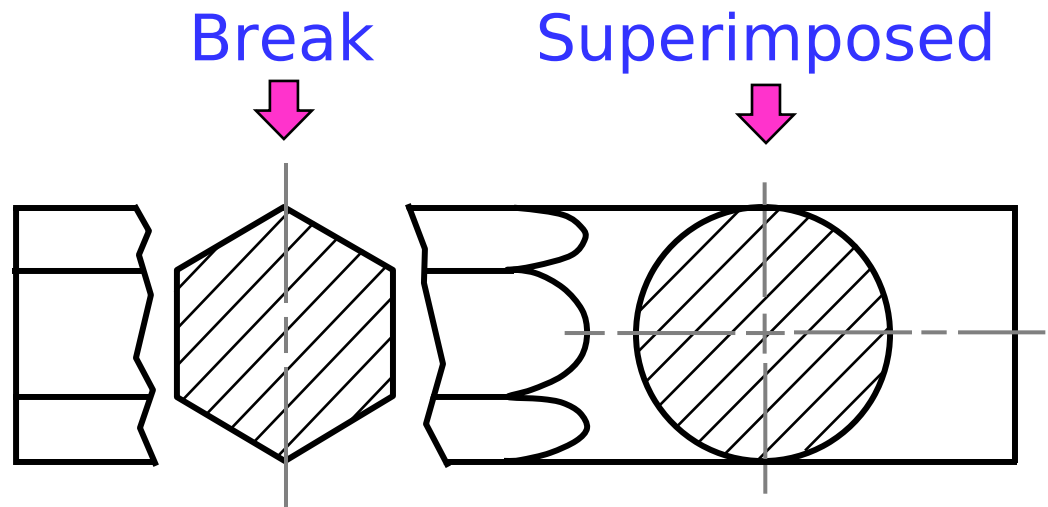
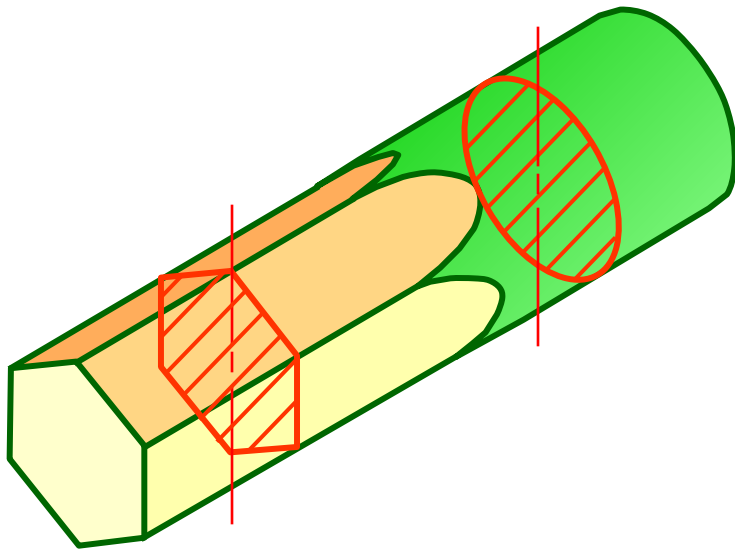


**FINAL  
PICTURE**

# Revolved Section View

## Placement of revolved section

1. Superimposed to orthographic view.
2. Break from orthographic view.

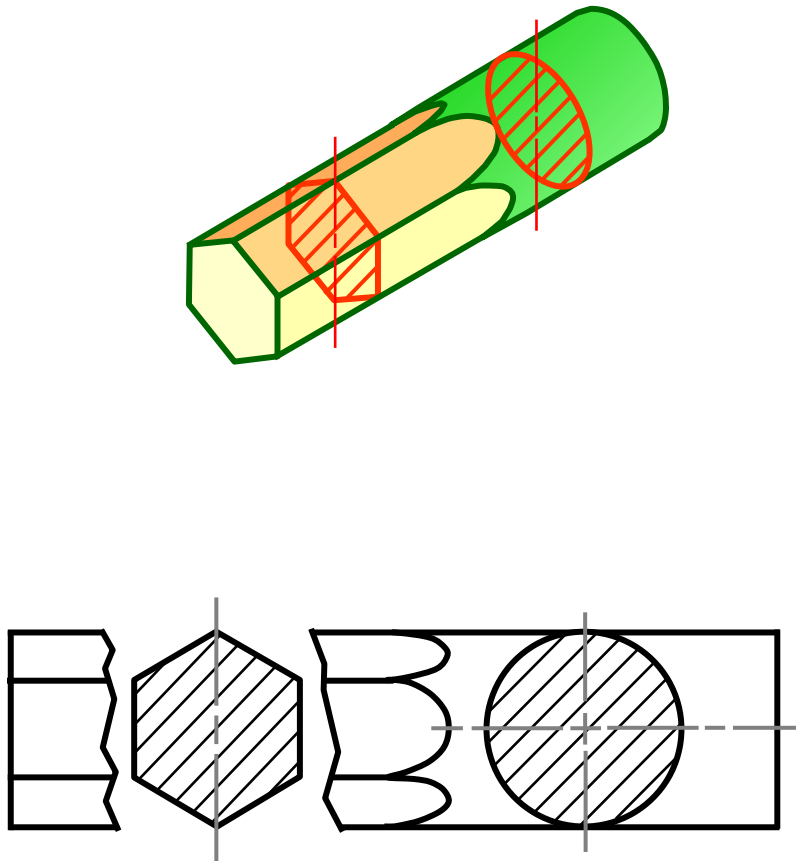


# Removed Section View

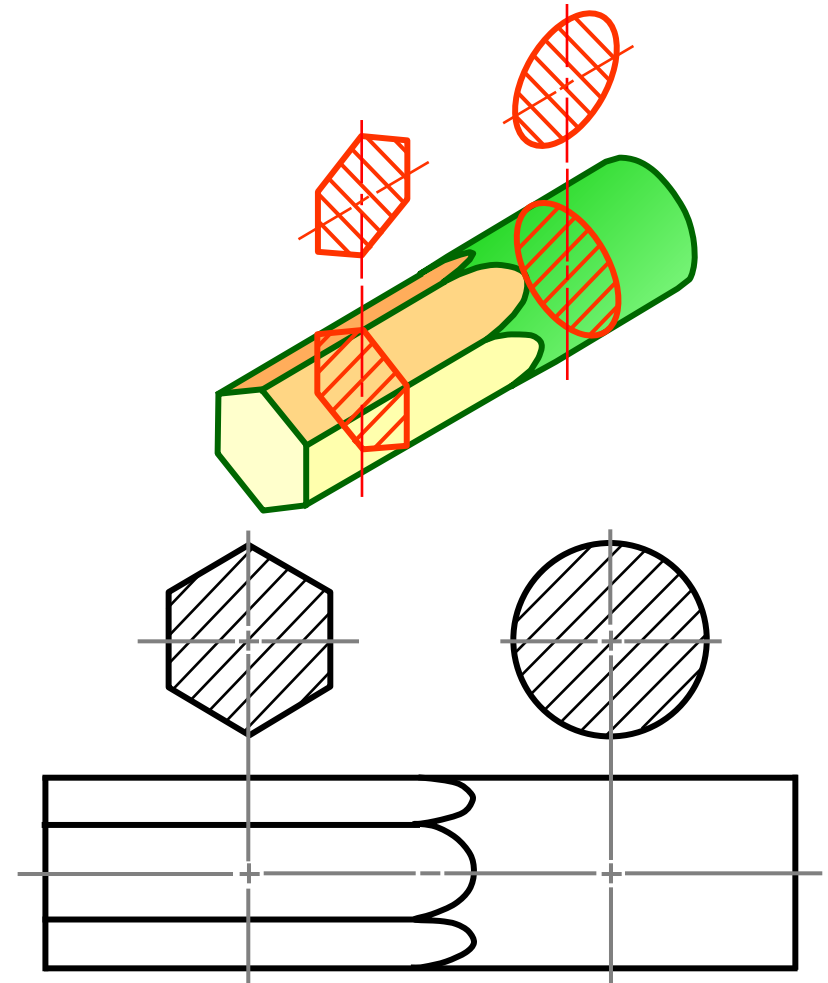
- Removed section is revolved section.
- Section view is shown outside the view.
- Used where space does not enough for revolved section
- Can be located elsewhere on a drawing with *properly labeled*

# Removed Section View

Revolved section

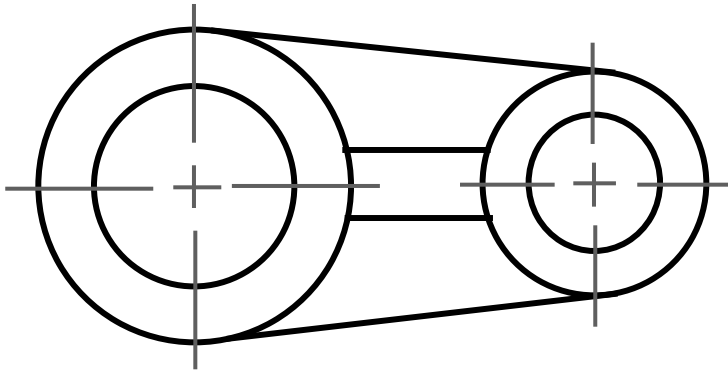


Removed section

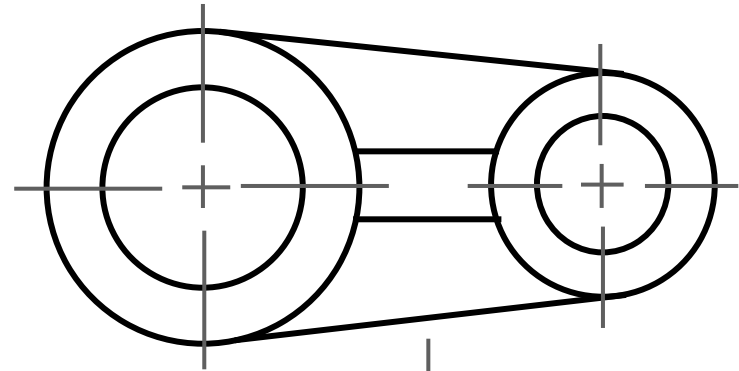


# Removed Section View

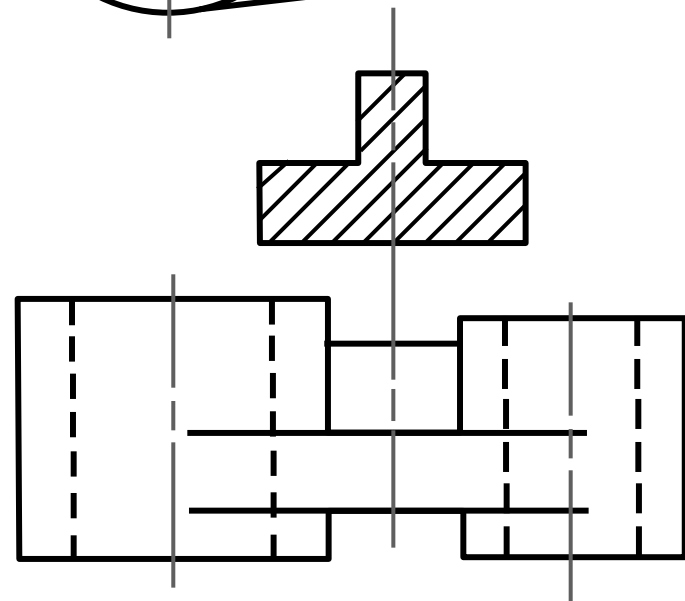
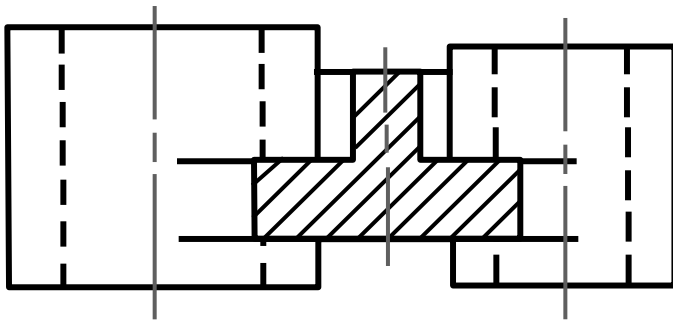
**Poor**



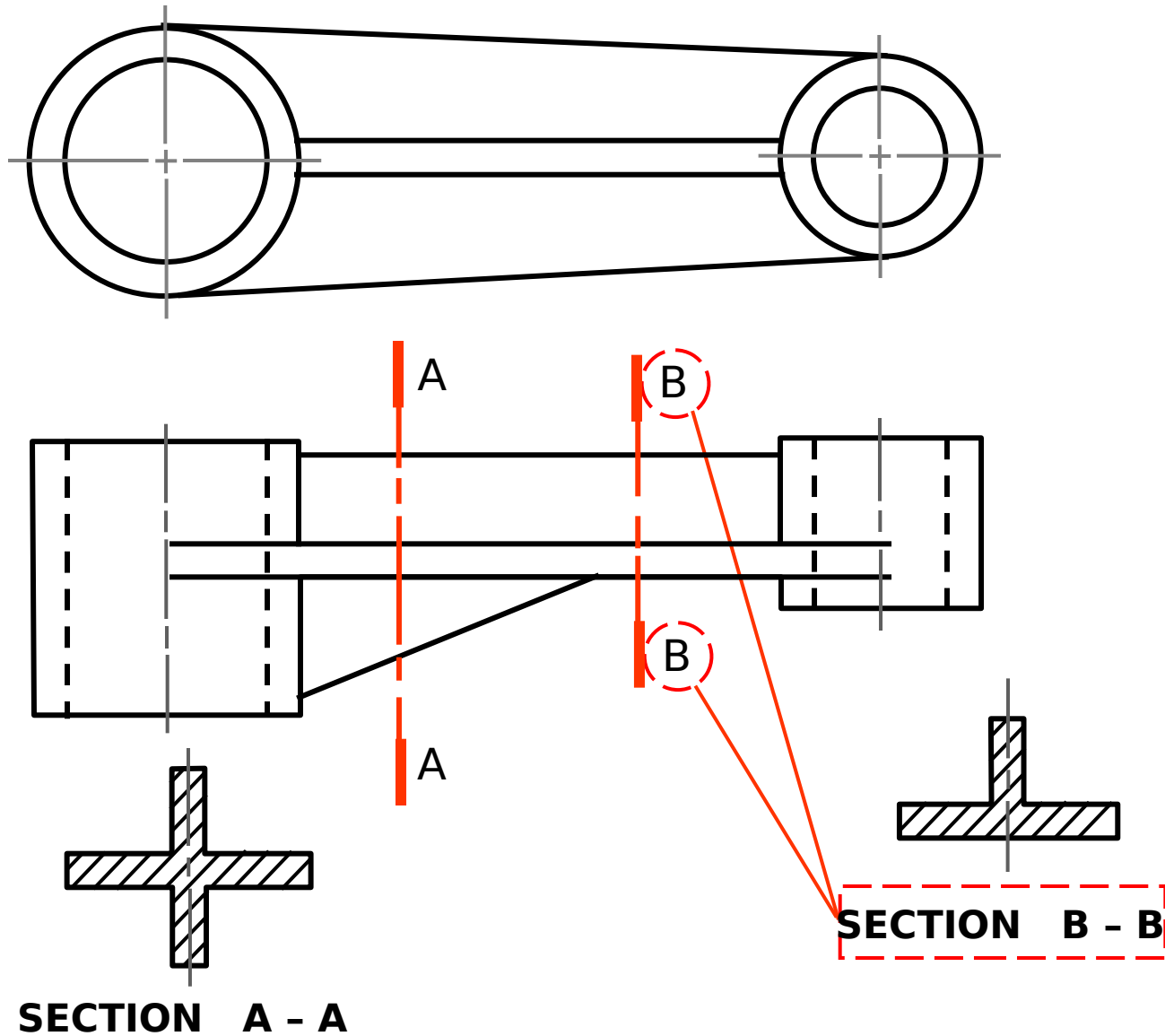
**Preferred**



**Too messy !!**



# Removed Section View

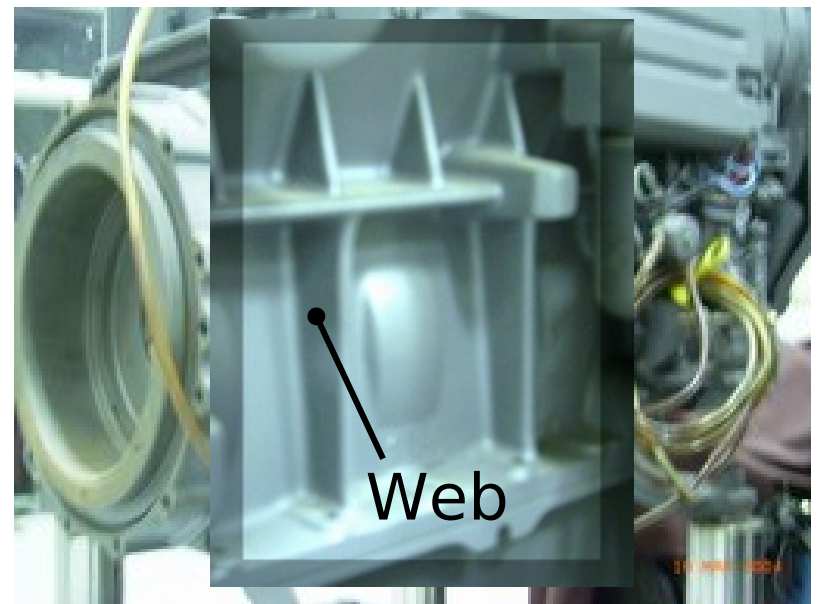


Section view  
representation of  
*rib*, *web*, *spoke* and  
*lug*



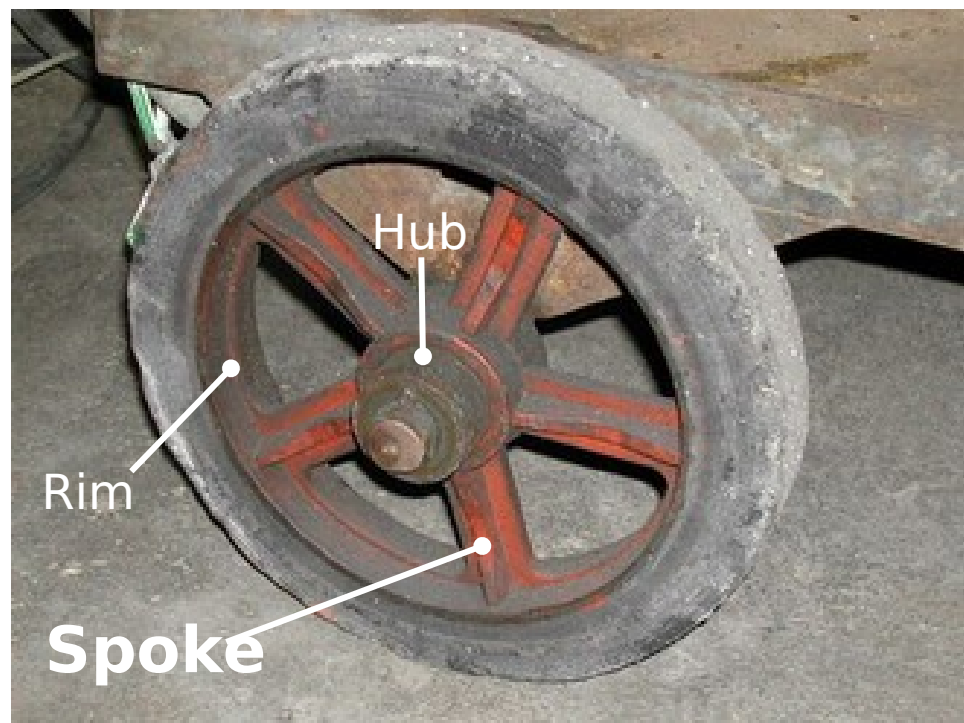
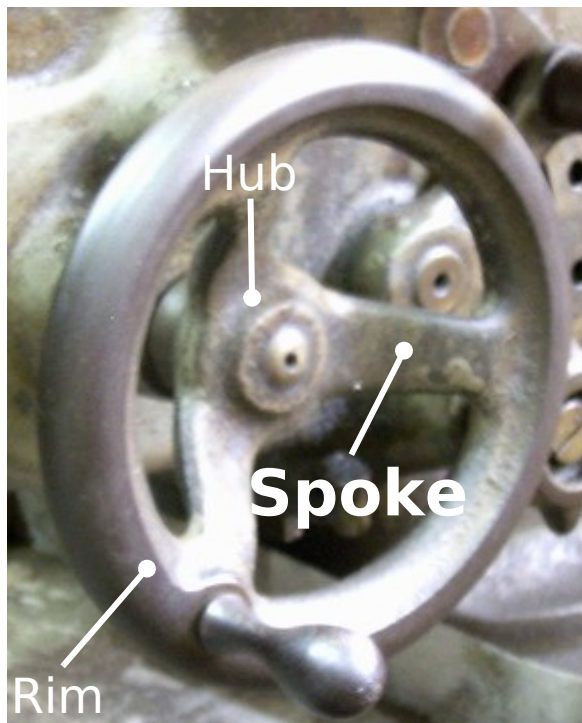
# Terminology

**Rib** and **Web** are thin, flat feature of an object that acts as a structural support.



# Terminology

**Spoke** is the rod radiating from the **hub** to the **rim** of a wheel.



# Terminology

**Lug** is an ear which is built as portion of an object for attachment.



# Terminology

**Lug** is an ear which is built as portion of an object for attachment.



# Conventional Practice

**Omit the section lines** on the section

view of

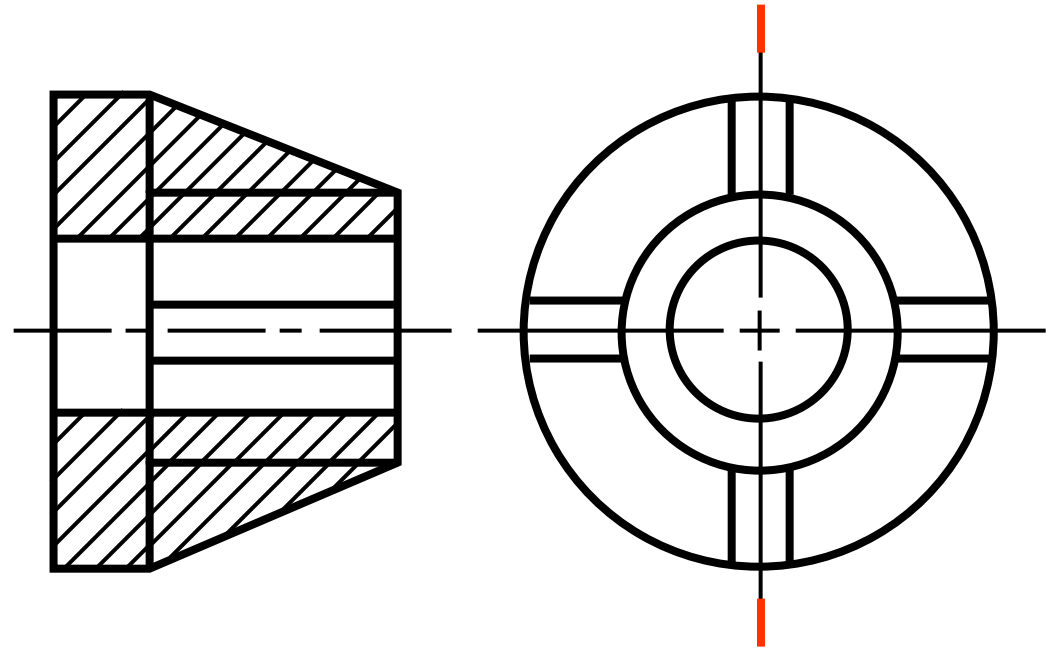
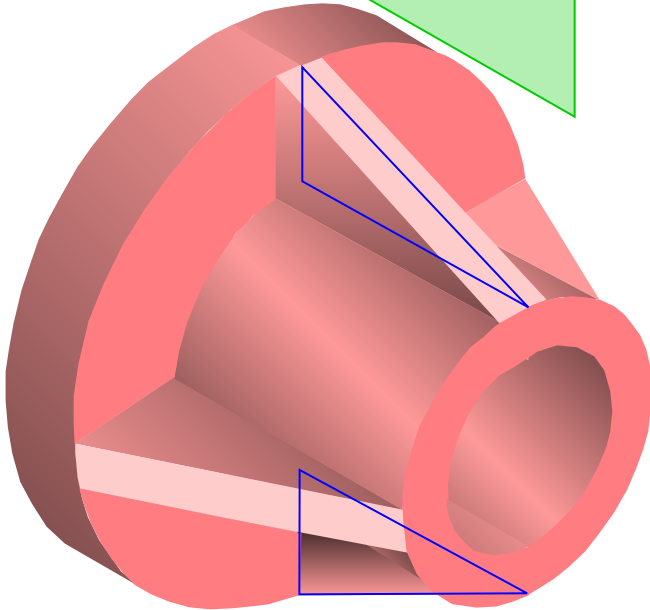
❖ **Rib**, **Web** and **Lug**, if the cutting plane is

❖ passed *flatwise* through.

❖ **Spoke**, if the cutting plane is passed *longwise*

through.

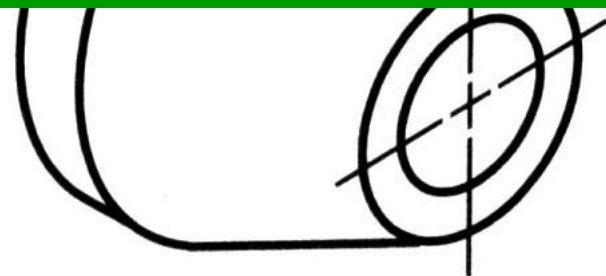
## EXAMPLE : *RIB*



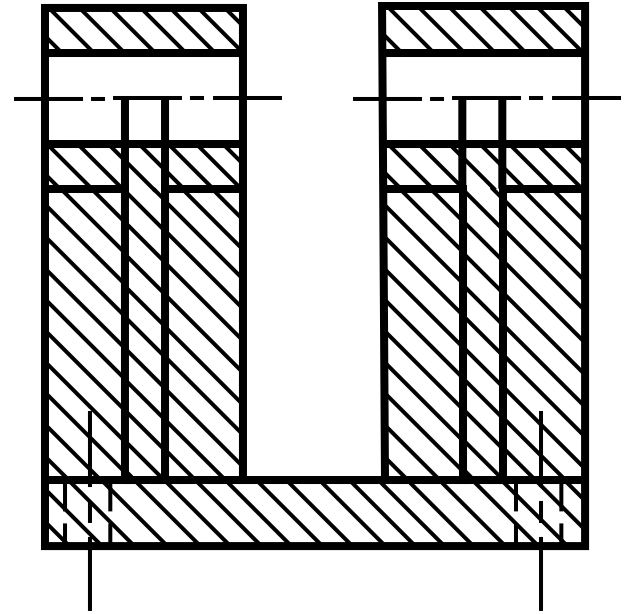
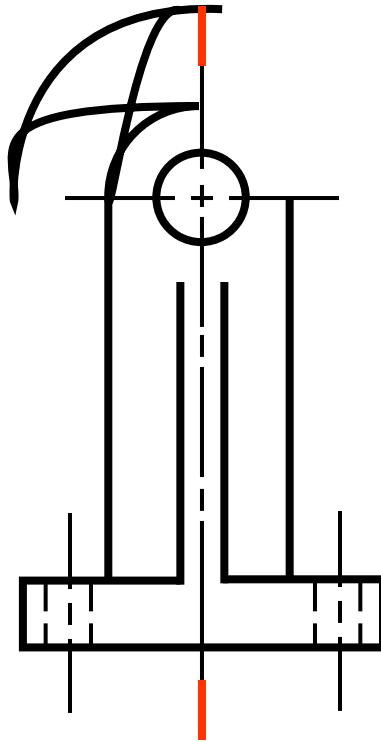
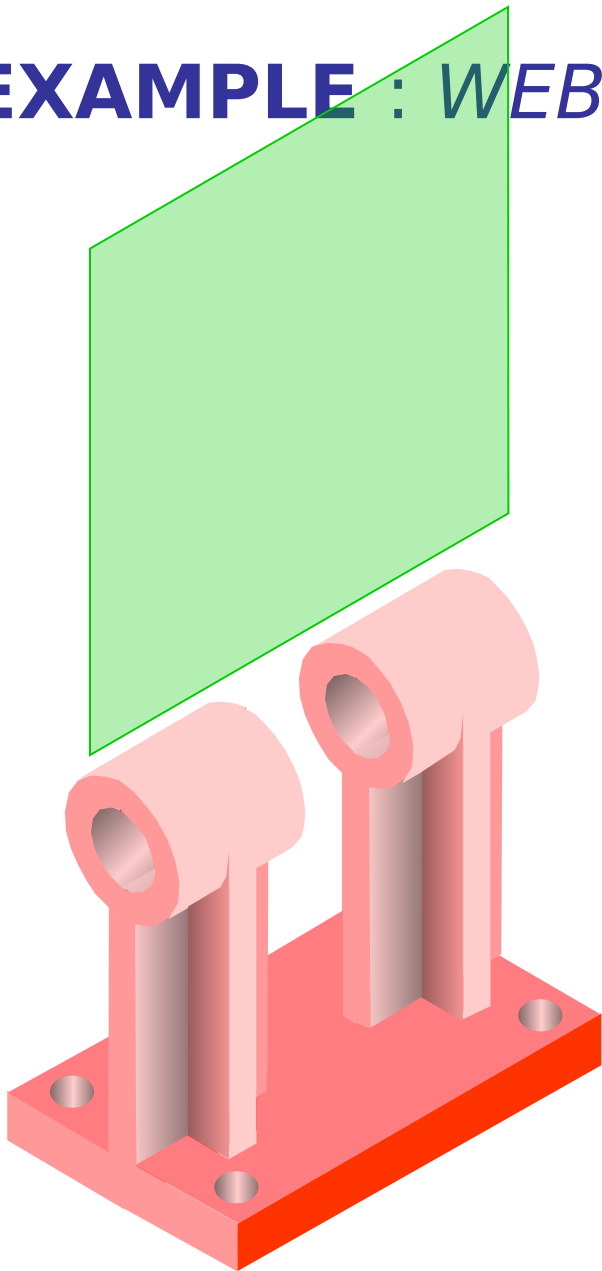
Normal multiview drawing

Normal section view

Section view drawing with convention



# EXAMPLE : WEB : *flatwise cut*

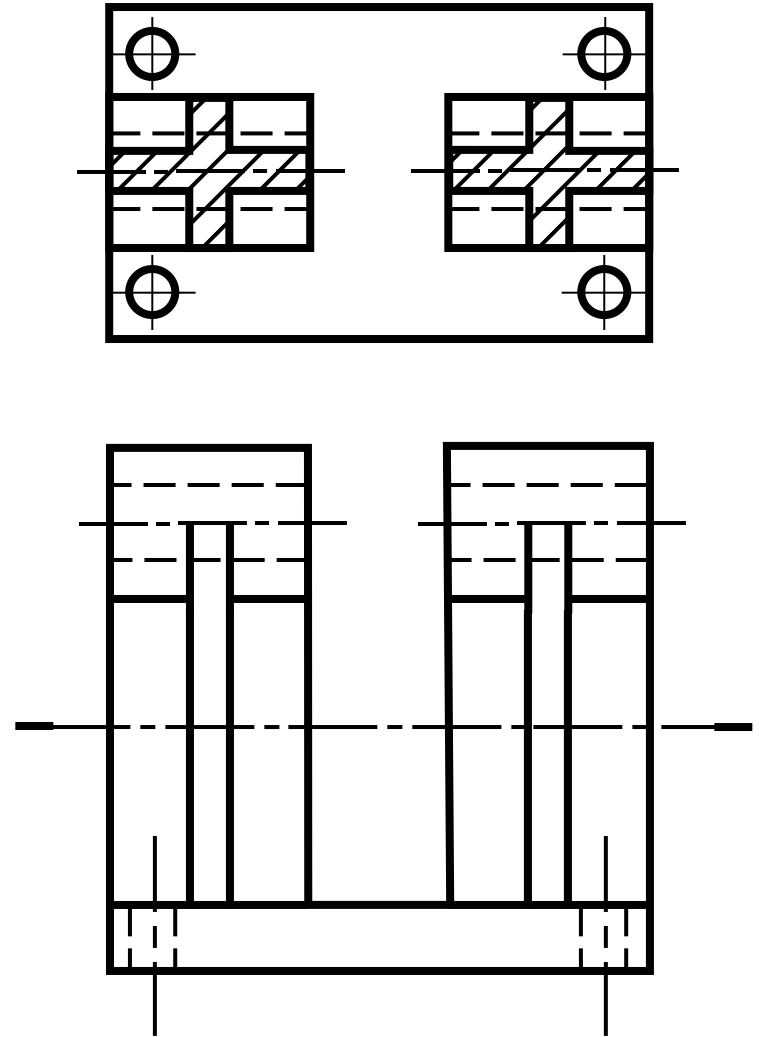
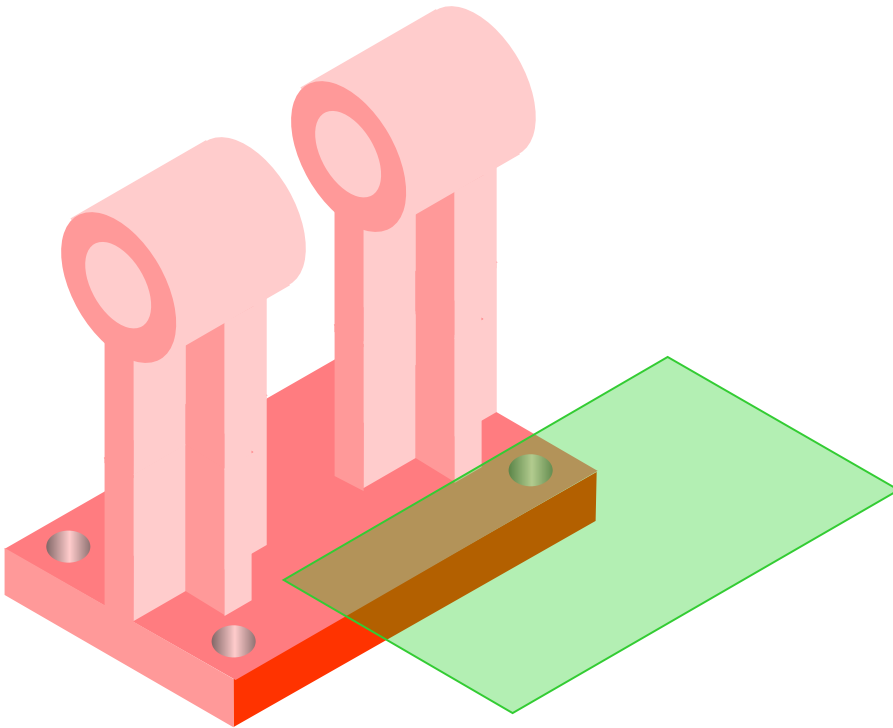


Normal multiview drawing

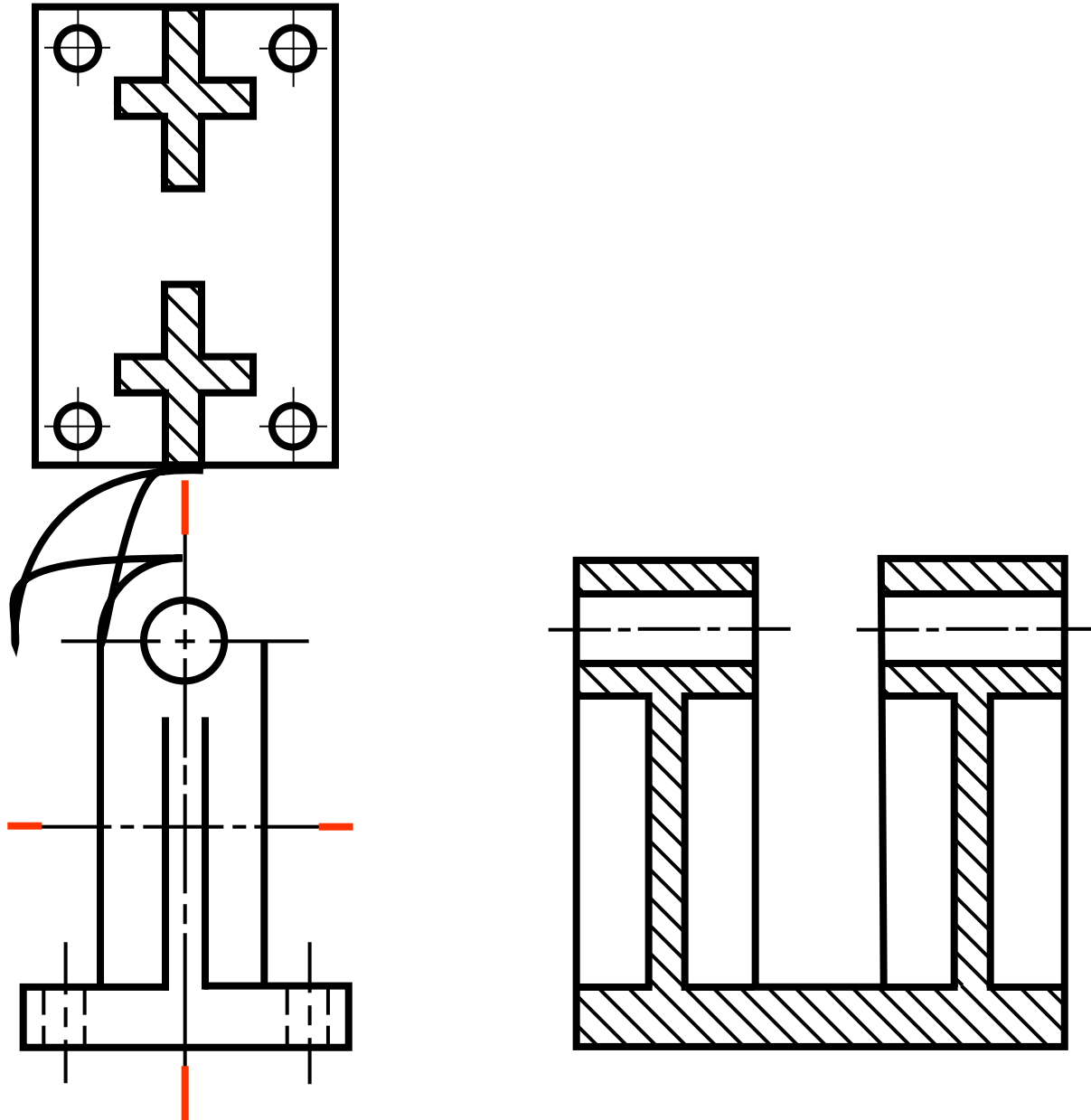
Normal section view

Section view drawing with convention

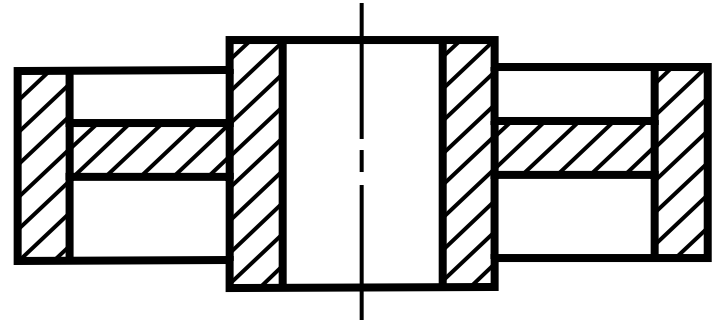
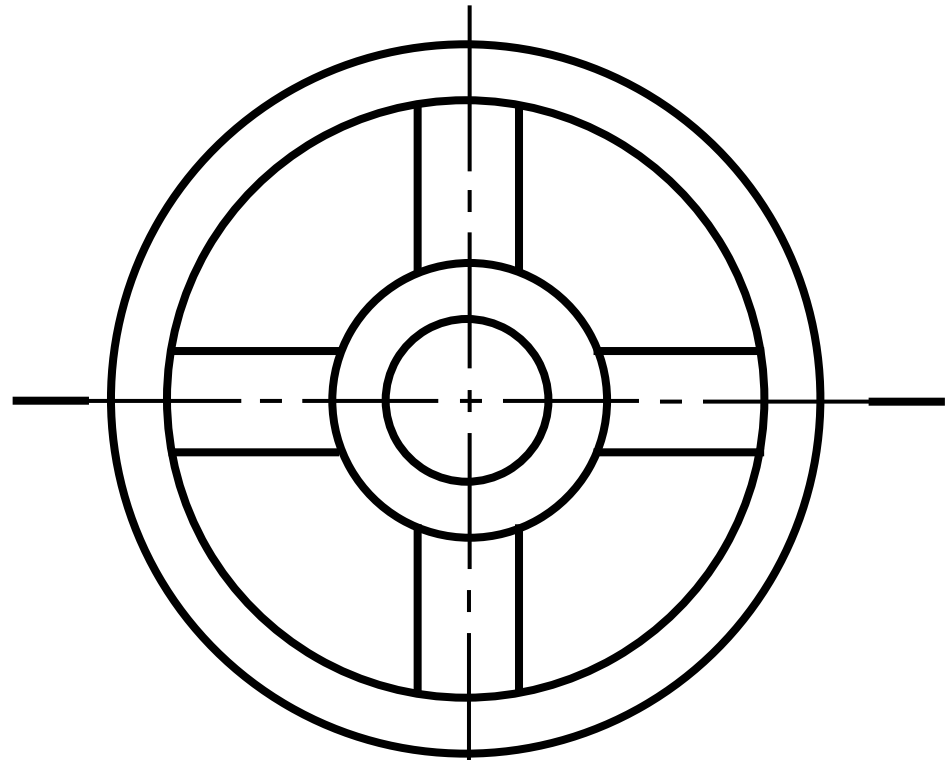
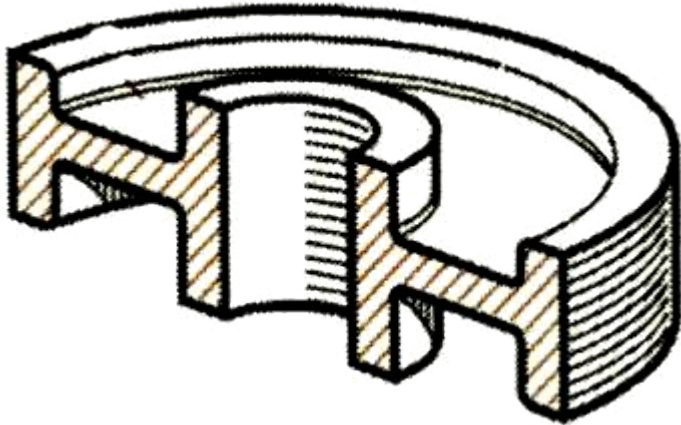
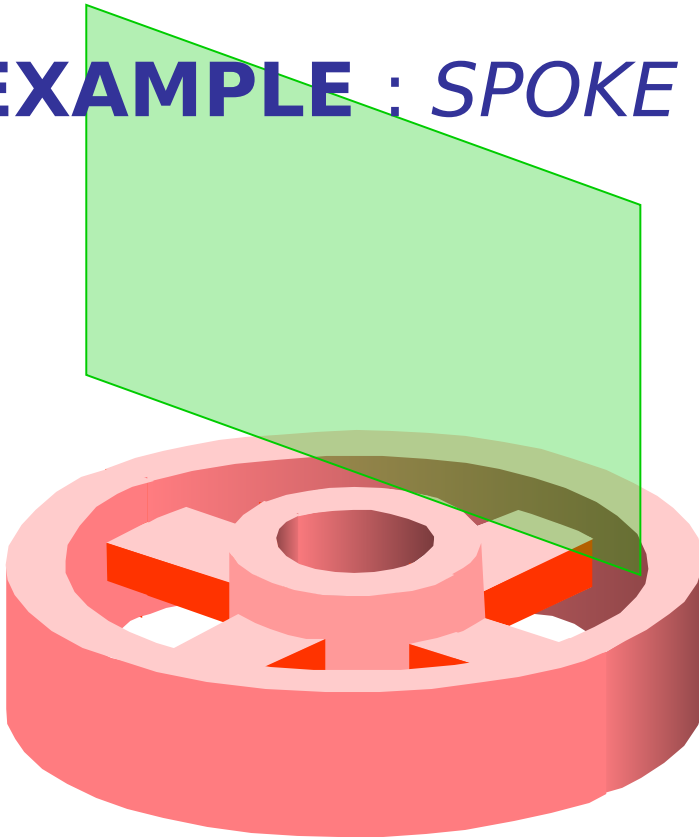
# EXAMPLE : WEB : crosswise cut



# EXAMPLE : *WEB* : multiple section view

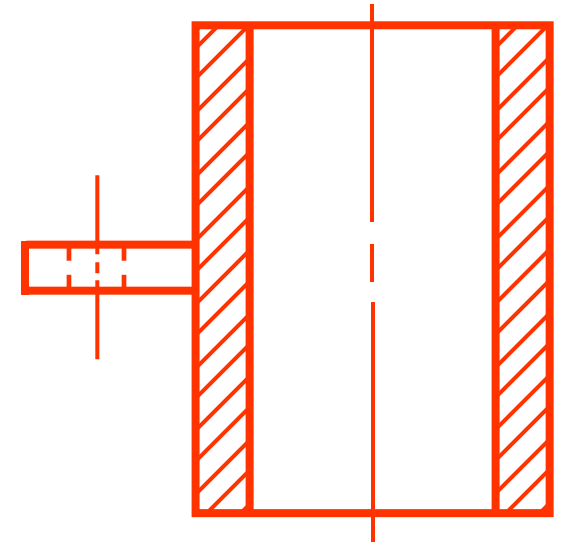
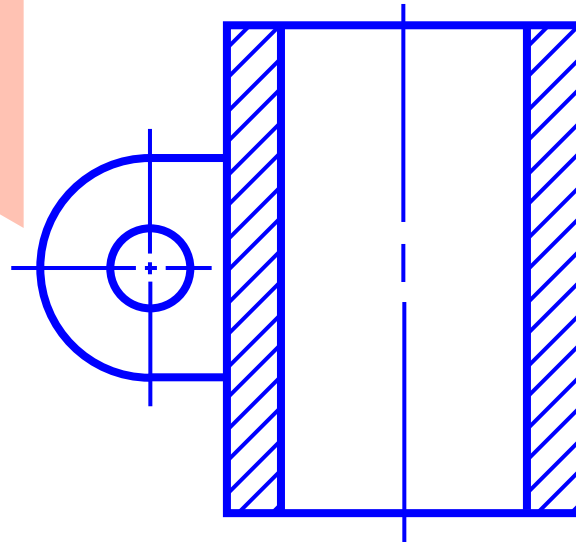
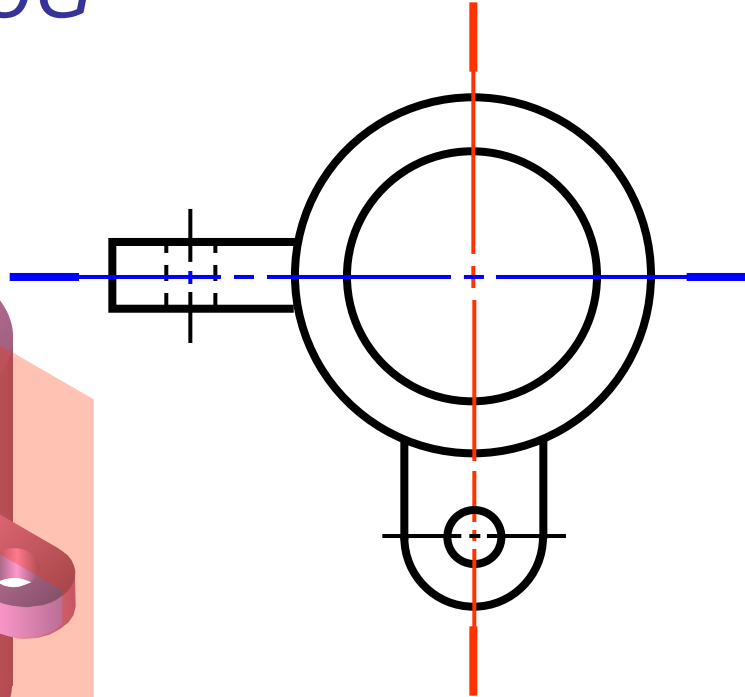
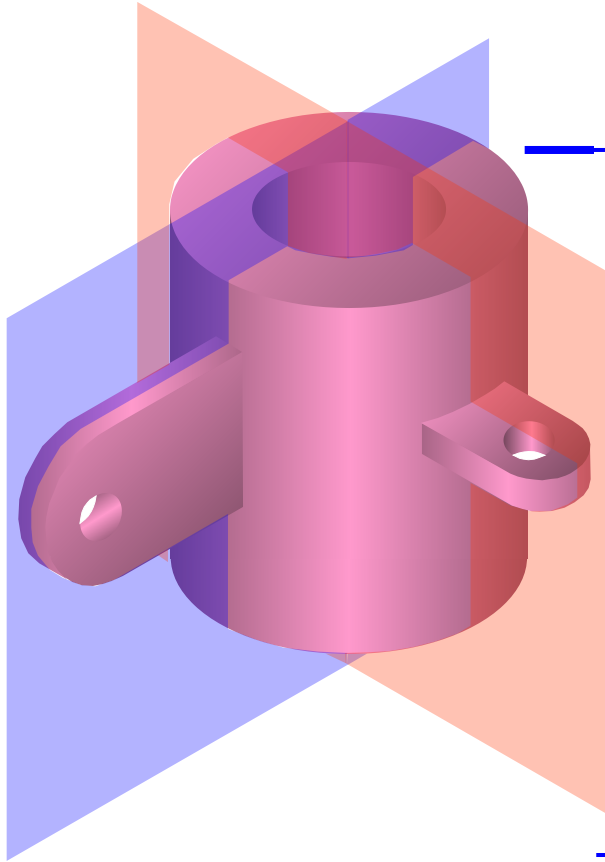


## EXAMPLE : *SPOKE*



Misleading  
impression

# EXAMPLE : *LUG*



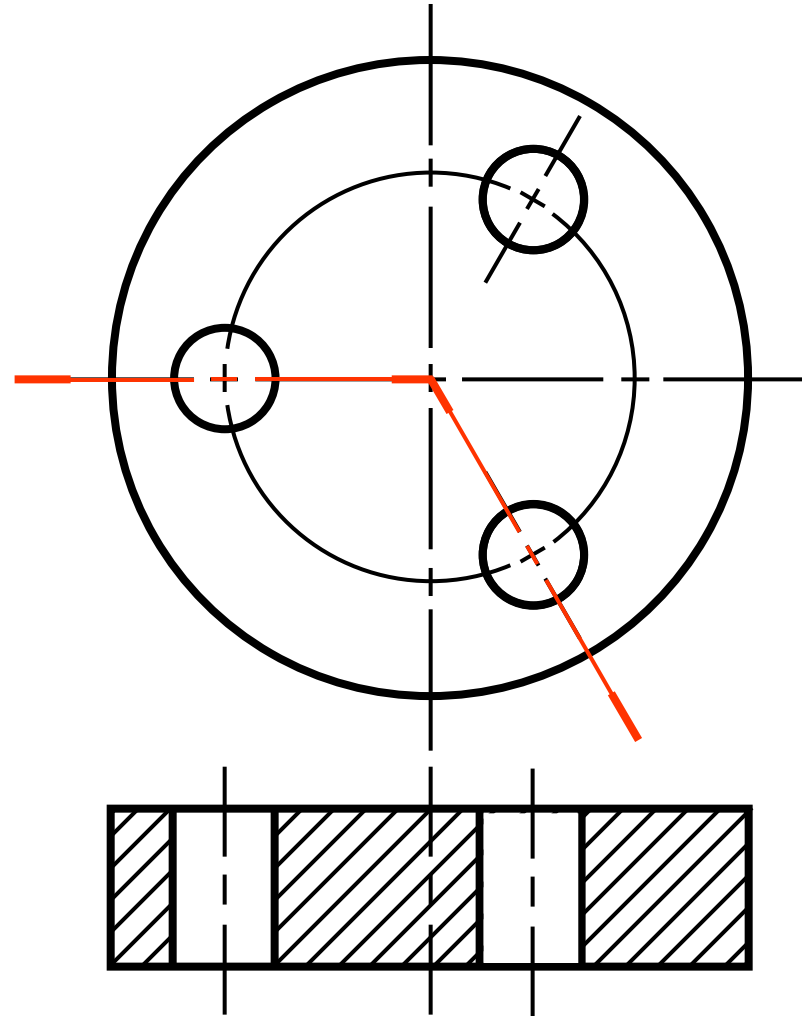
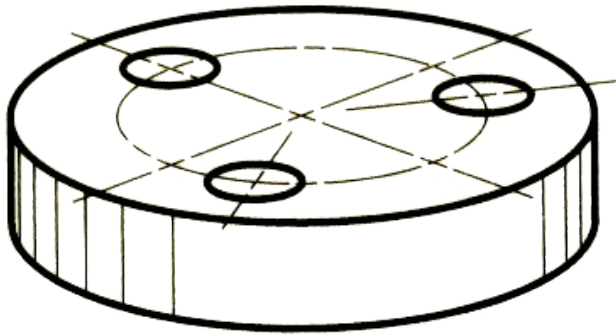
# *Aligned Section*



# Definition

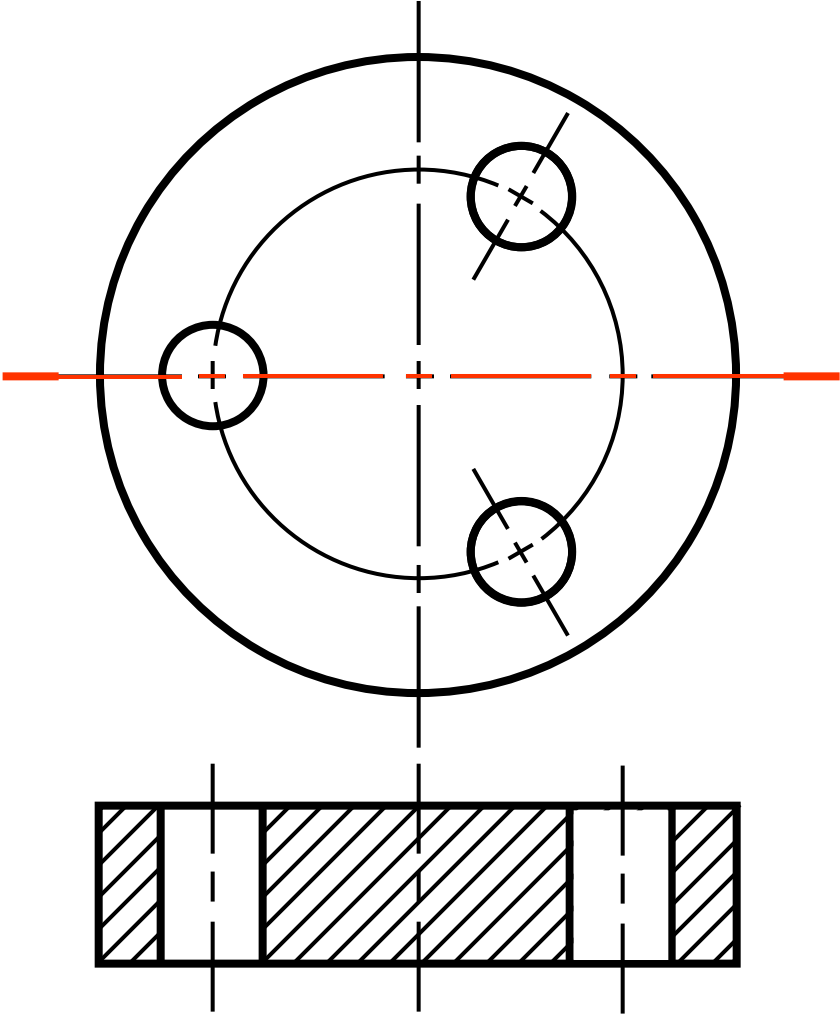
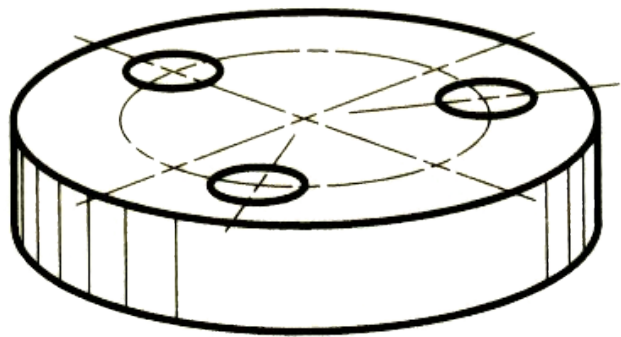
**Aligned section** is a section view that is drawn by *imaginary rotating* the object's features appeared in a principal view about symmetry axis

## Example : *Hole*

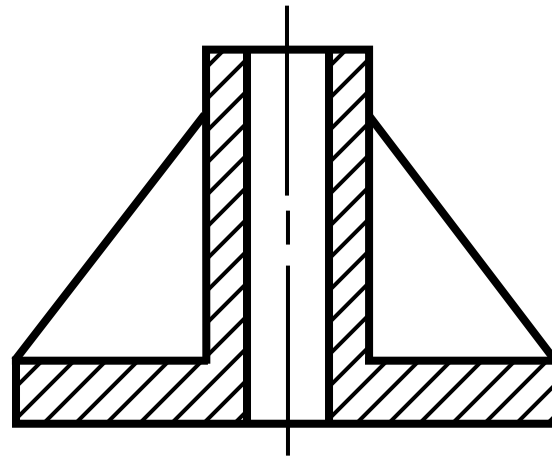
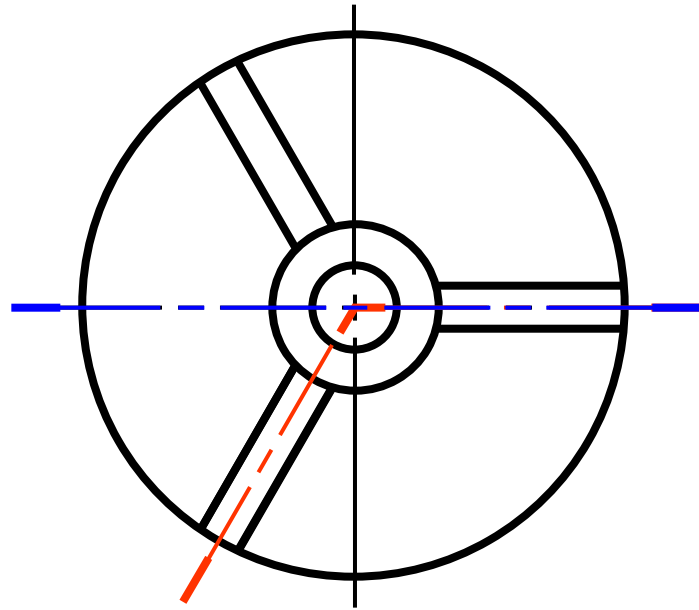
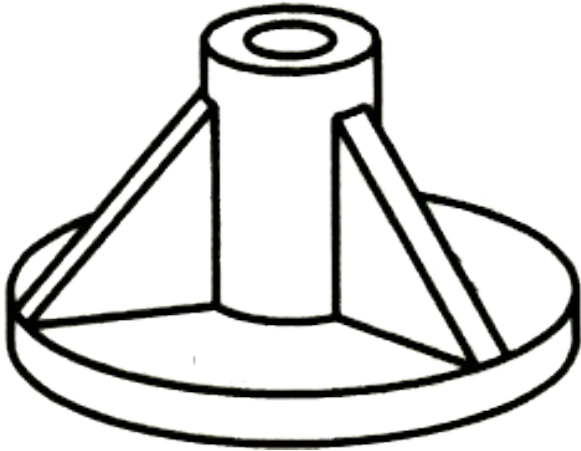


Gives the impression that this  
holes are at unsymmetrical  
position.

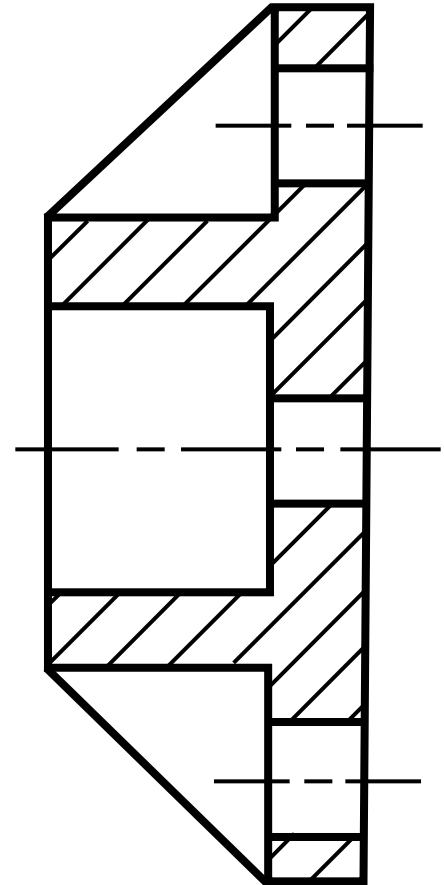
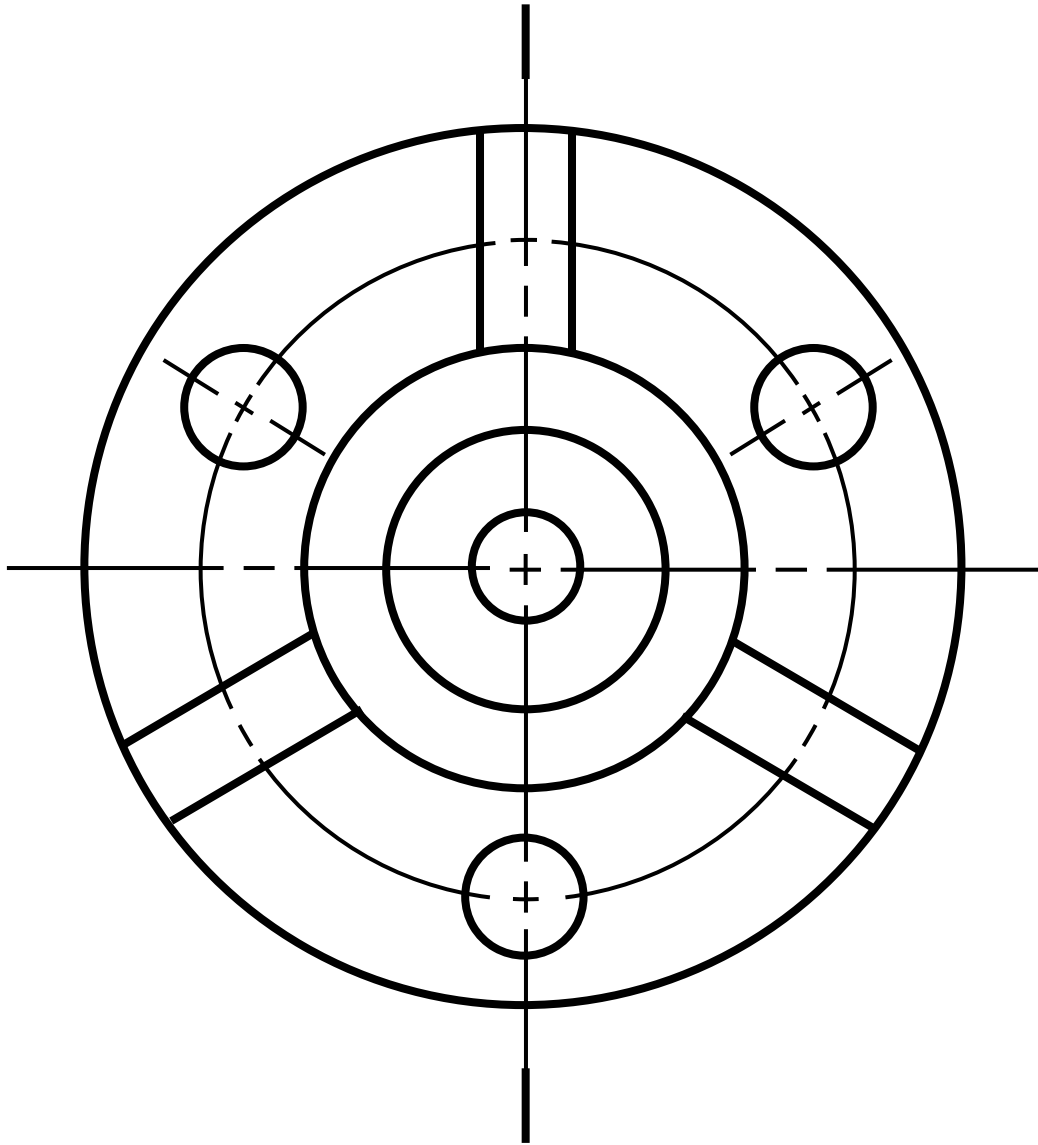
**Example :** *Hole*



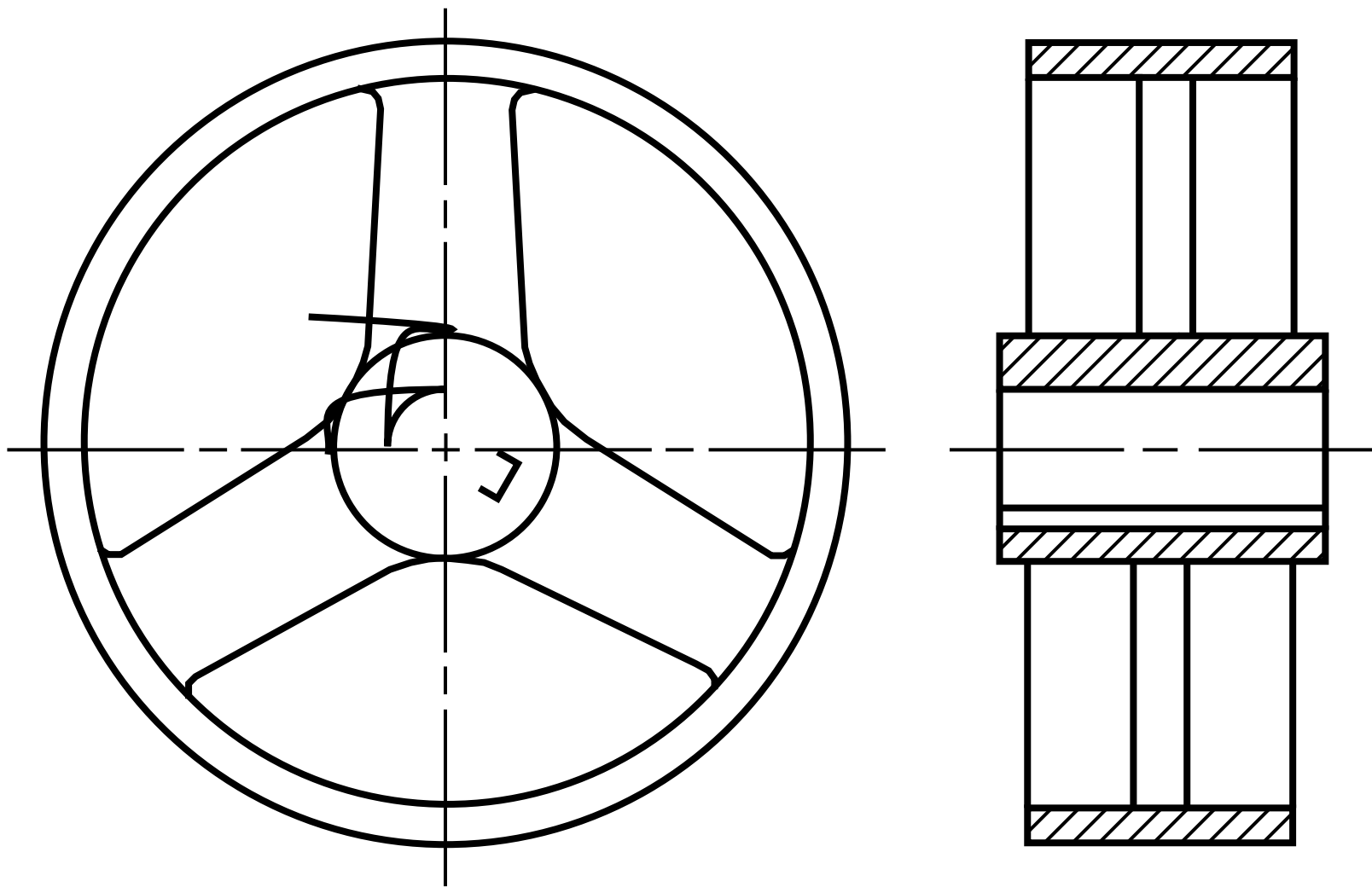
## Example : *Rib*



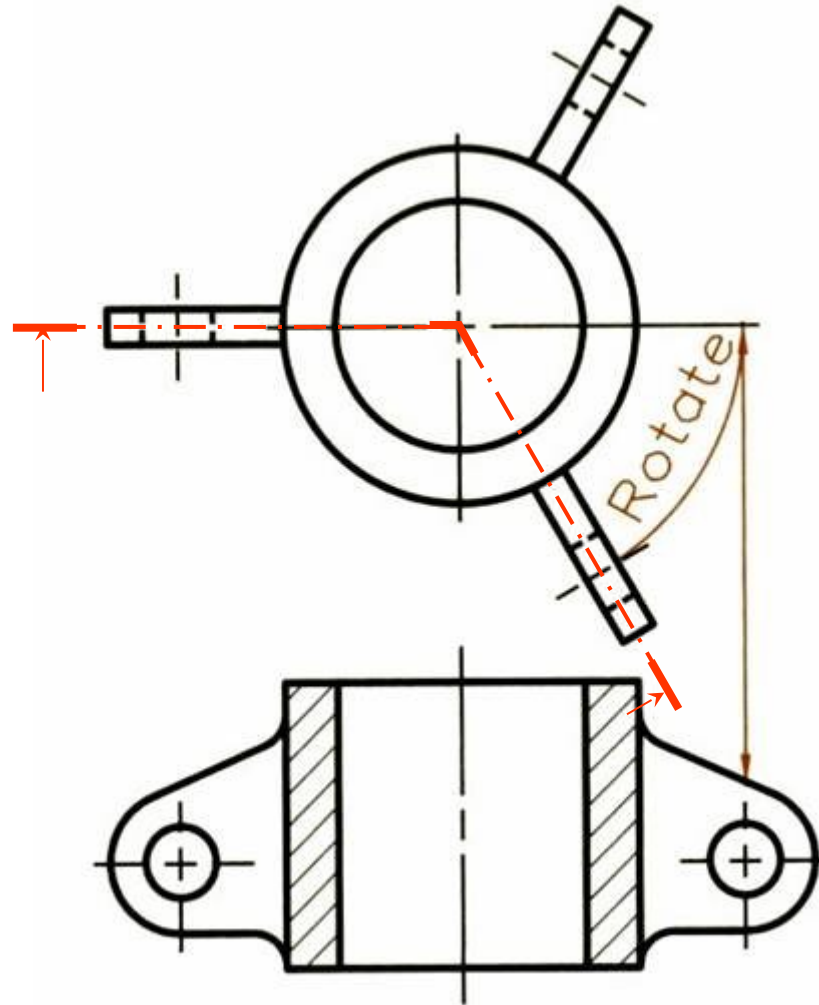
## Example : *Ribs & Holes*



**Example :** *Spoke & Keyway*



## Example : *Lug*



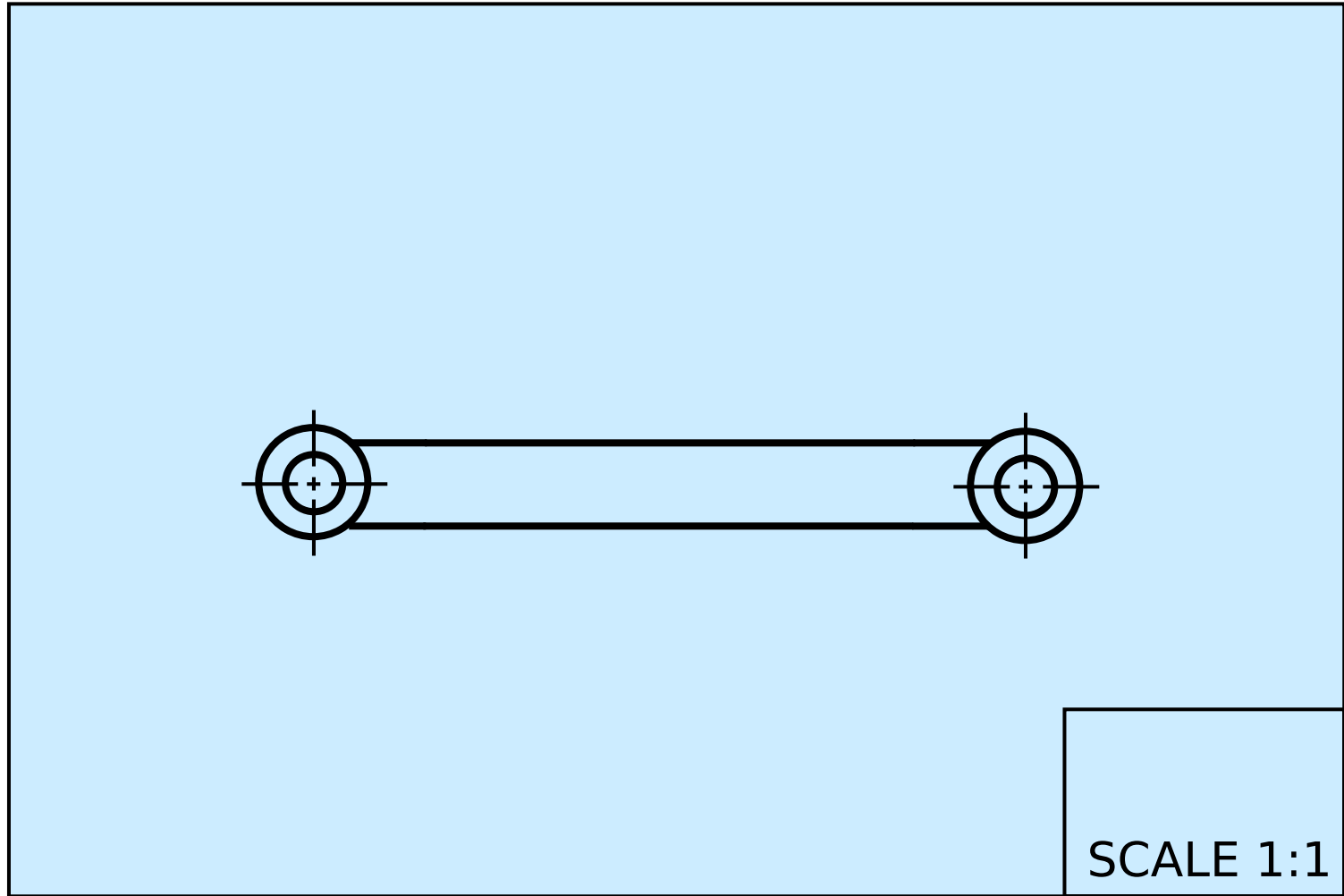
# *Conventional Break*



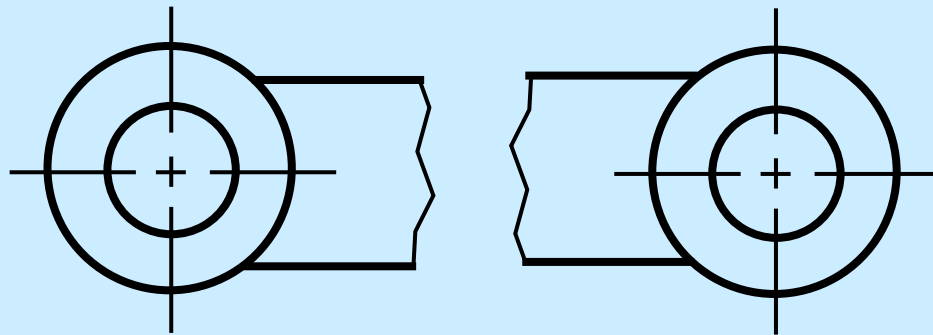
# CONVENTIONAL PRACTICE

For *long objects* that have to draw in a small scale to fit them on the paper, it is recommended to remove its long portion (which contains *no* important information) and draw the break lines at the broken ends.

# Example



# Example

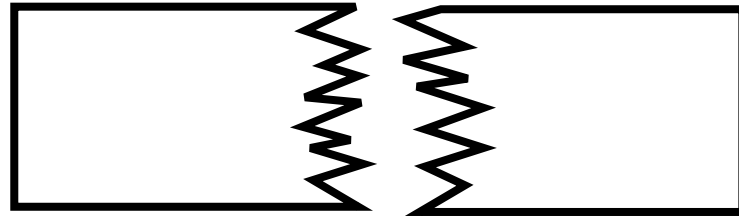


SCALE 2:1

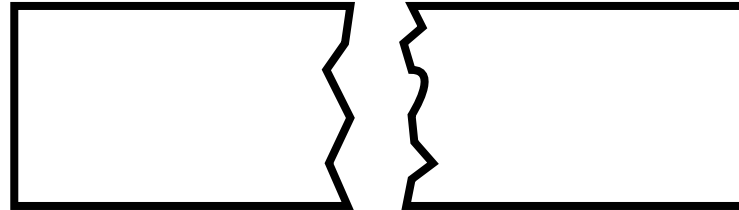
# STANDARD BREAK LINES

Rectangular  
cross section

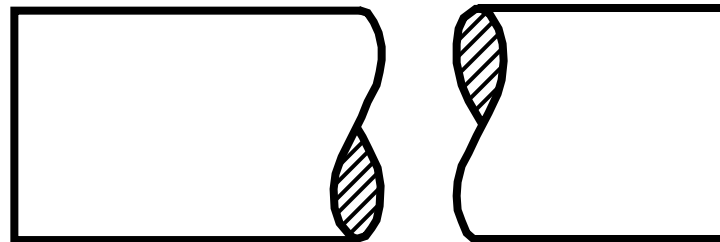
Wood



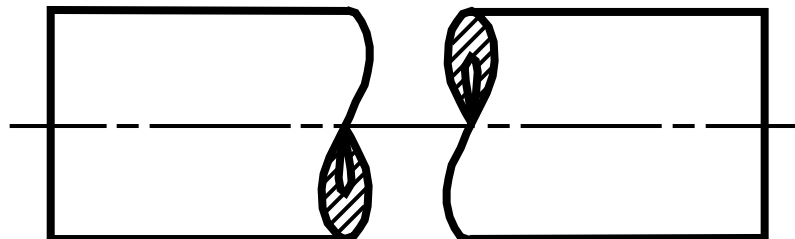
Metal



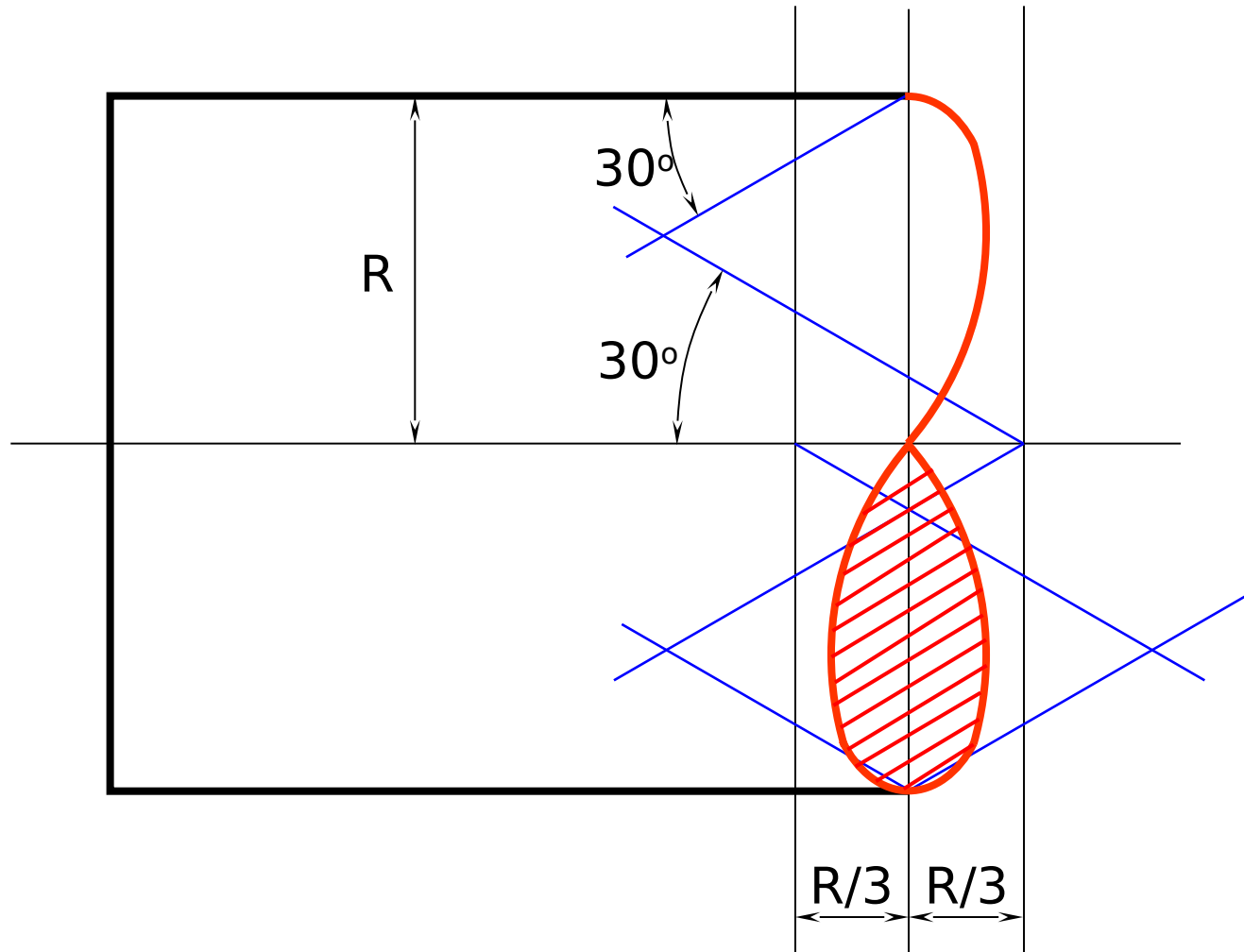
Cylindrical  
cross section



Tubular  
cross section

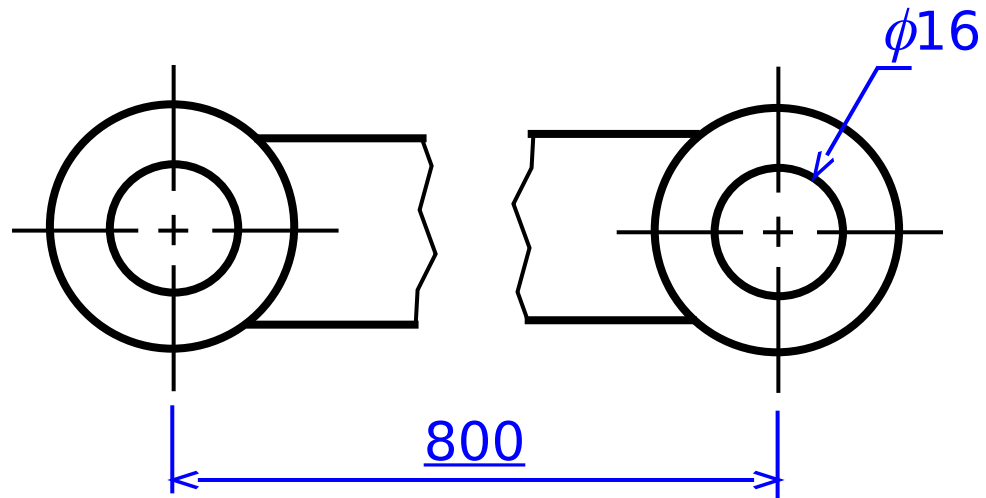
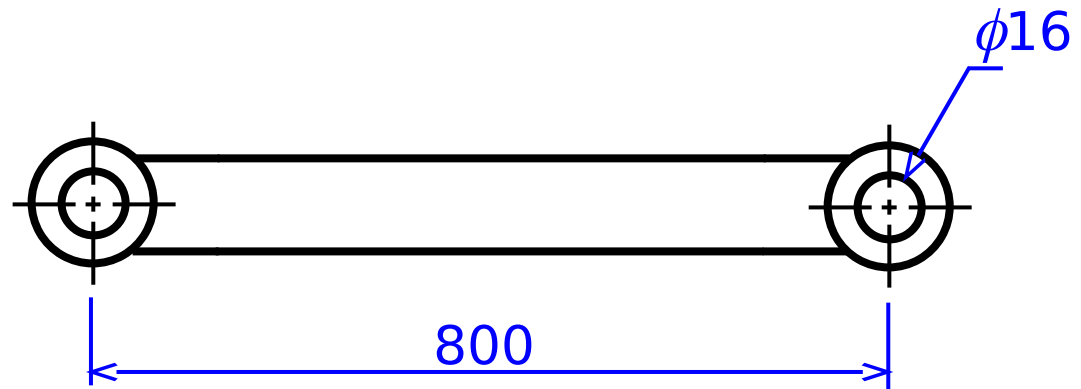


# TO DRAW CYLINDRICAL BREAK



# TO DIMENSION A BROKEN PART

Typical  
dimensioning  
method



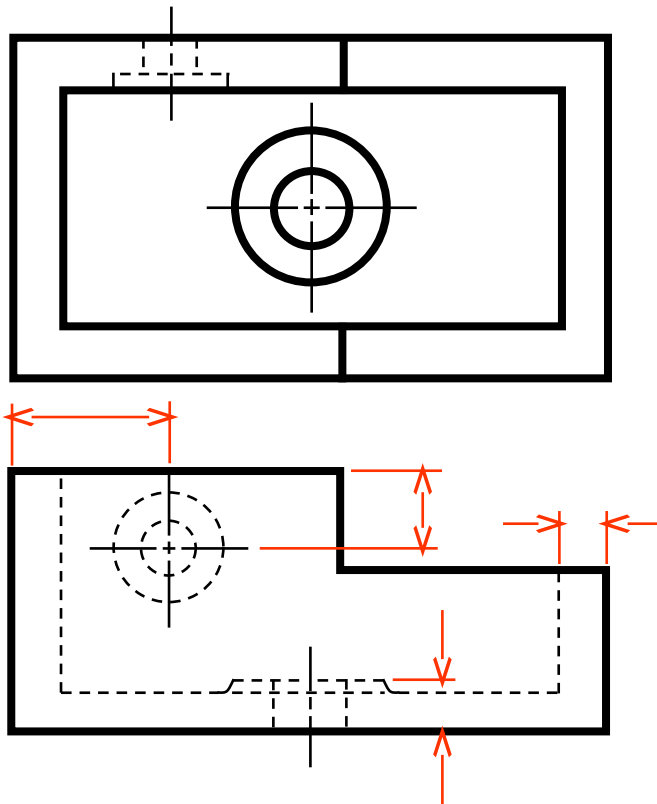
not to scale dimensions

# *Dimensioning in Section View*

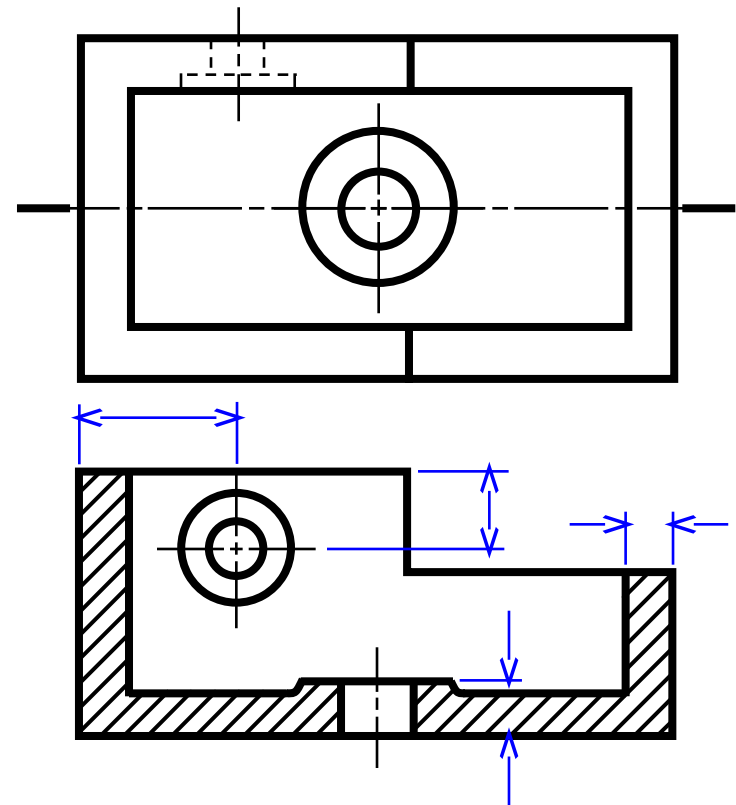


■ In most cases, dimensioning of the section views follows the typical rules of dimensioning.

**POOR**

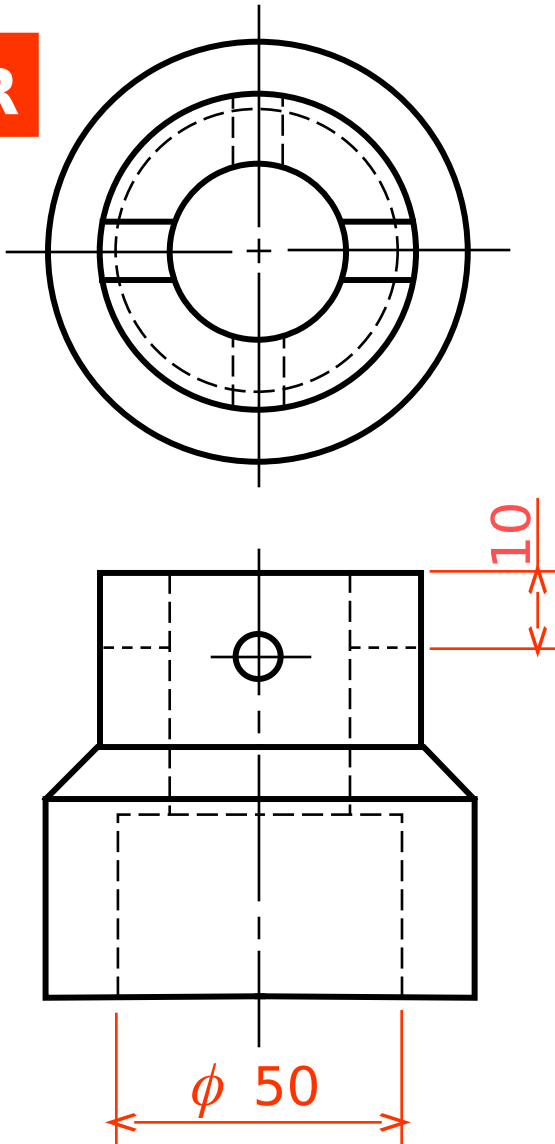


**GOOD**

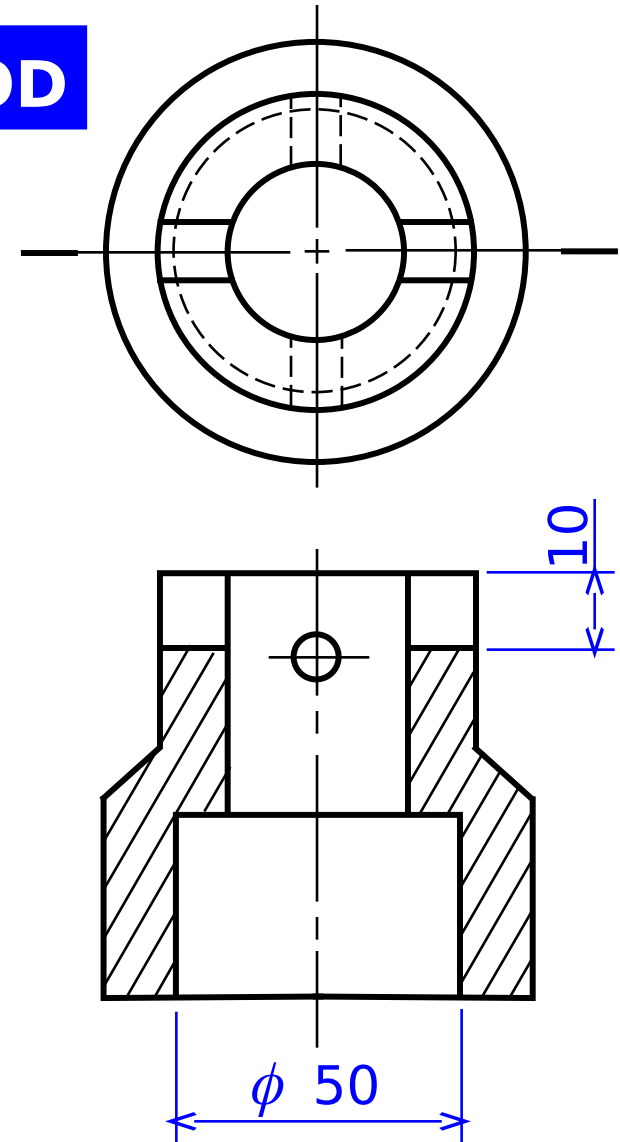


# DIMENSIONING

**POOR**

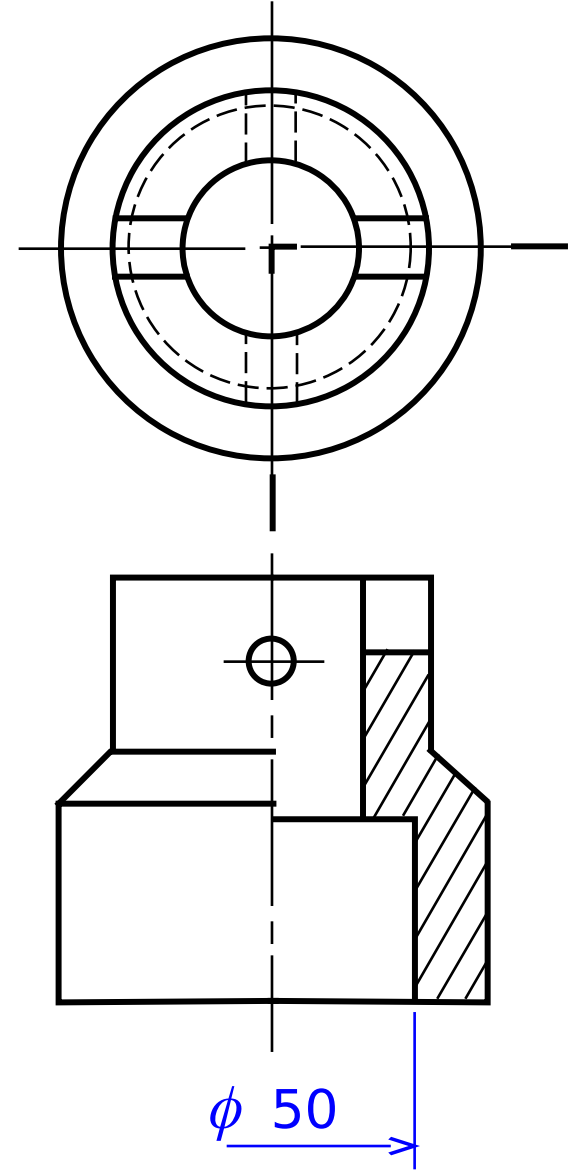


**GOOD**



# DIMENSIONING

■ For a half-section view, use dimension line with only one arrowhead that points to the position inside the sectioned portion.



# ***End of Chapter Six***