Principles of Mechanical Drawings - SECTIONING

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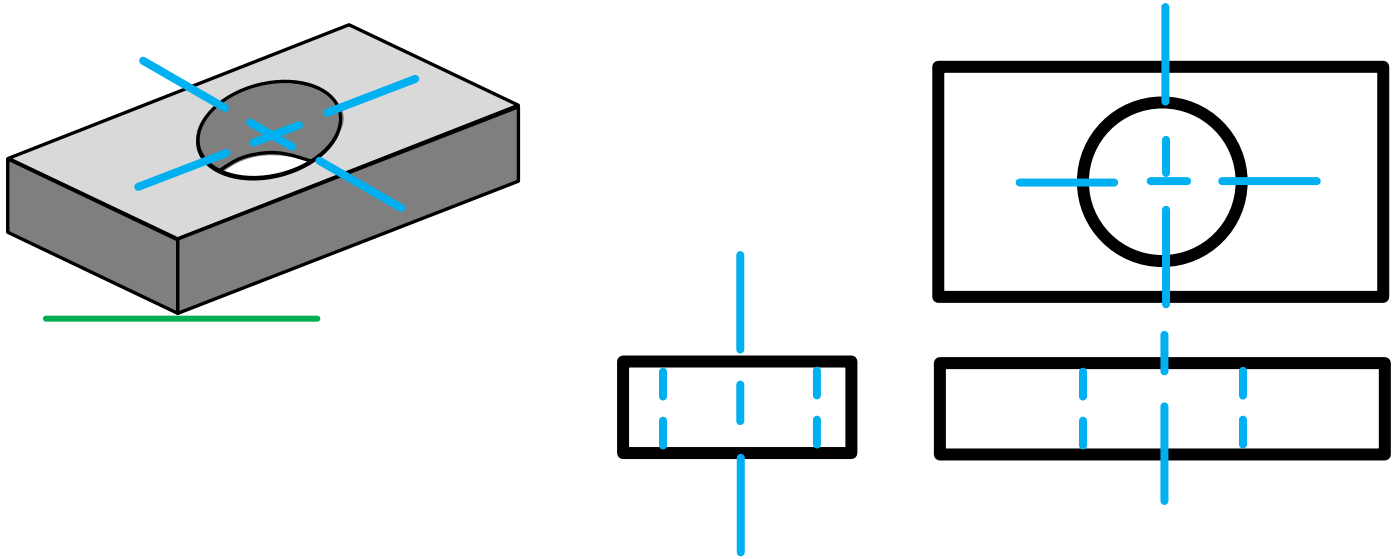
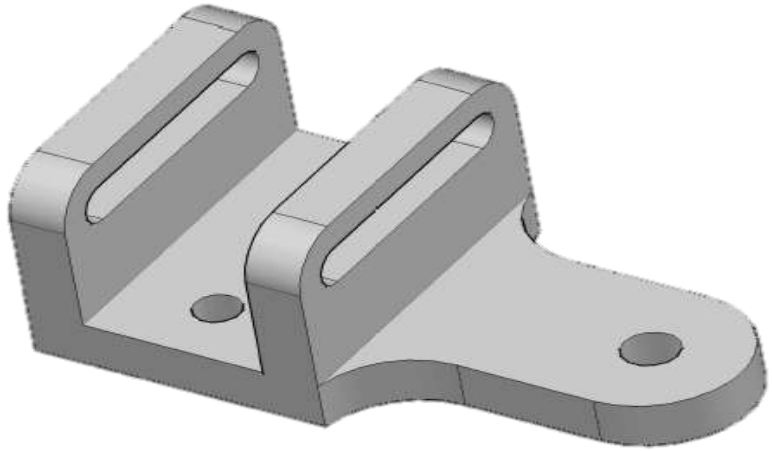
Mechanical Drawings

- Mechanical illustrations can be a simple **isometric drawing** to be drawn in **Third Angle Orthographic Projection (T.A.O.P.)** or the other way round.



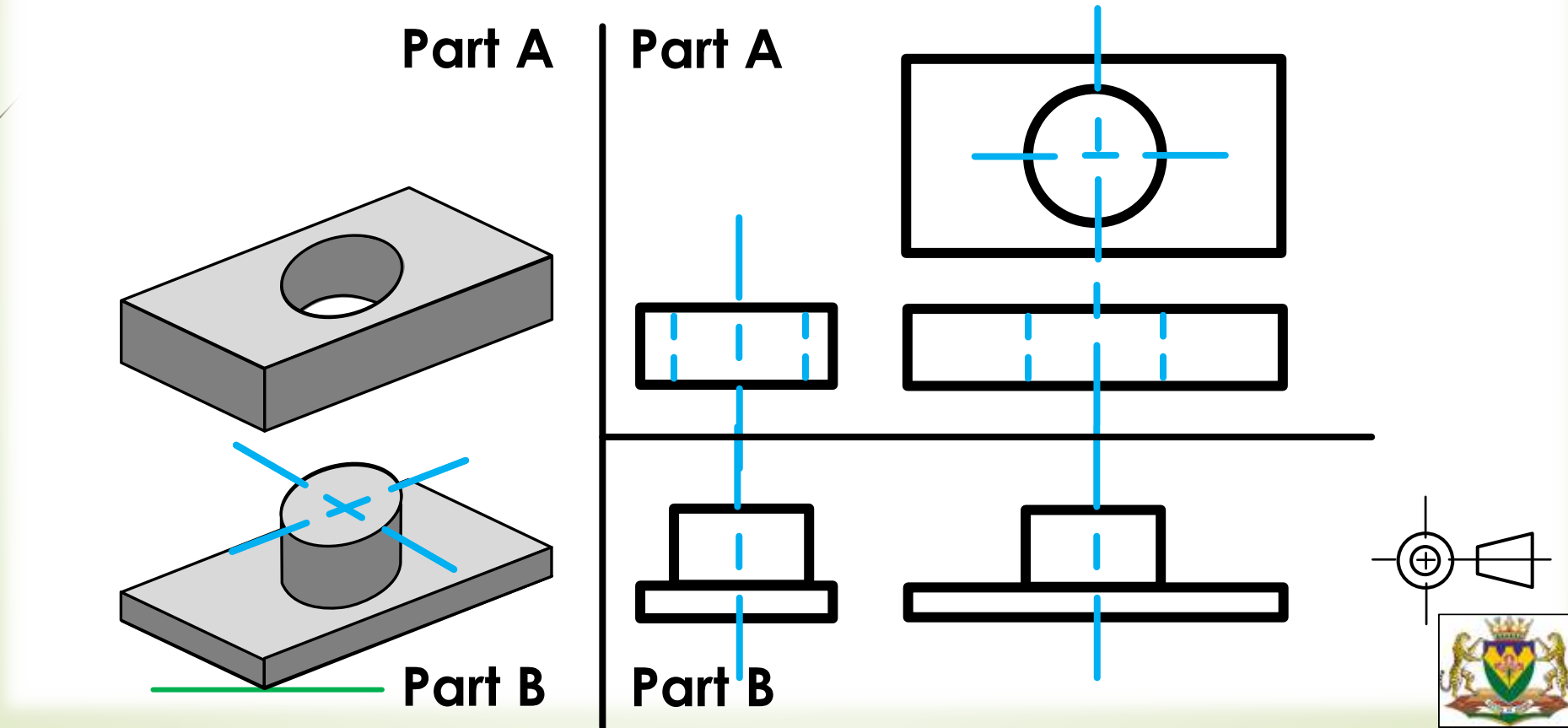
Mechanical Drawings

- **Mechanical drawings** usually shows castings, parts or portions of mechanical components used in industry.



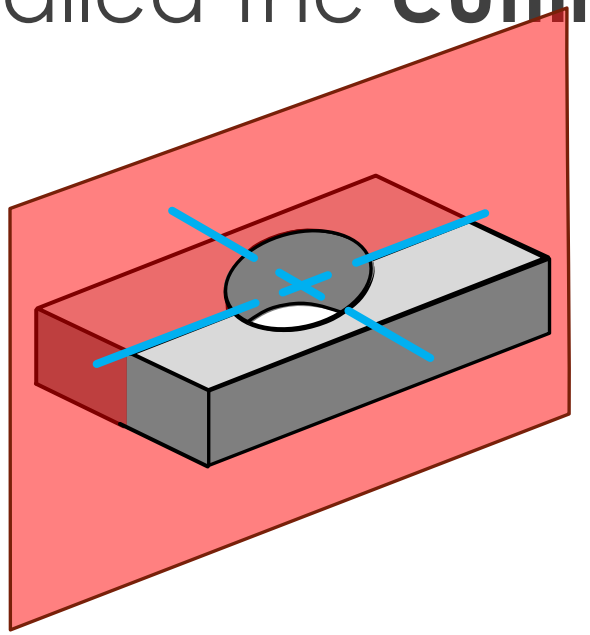
Mechanical Drawings (assembled drawings)

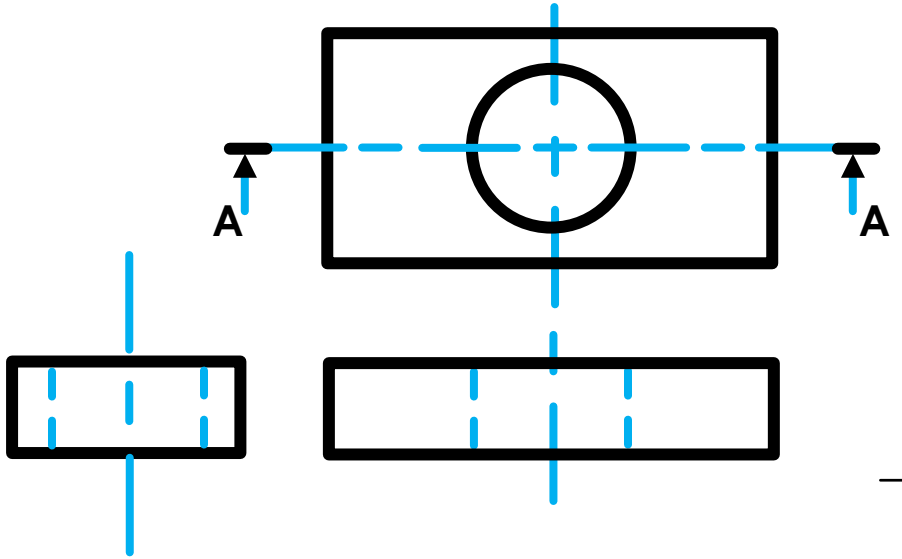
- **Assembled drawings** is when mechanical components consisting of different machine parts are assembled as a unit.

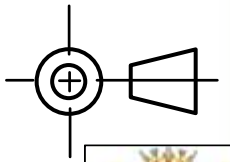


Mechanical Drawings (sectioning)

- **Section drawings** is when mechanical components is cut to show the **inner detail**. The line indicating the point of sectioning is called the **cutting plane**.

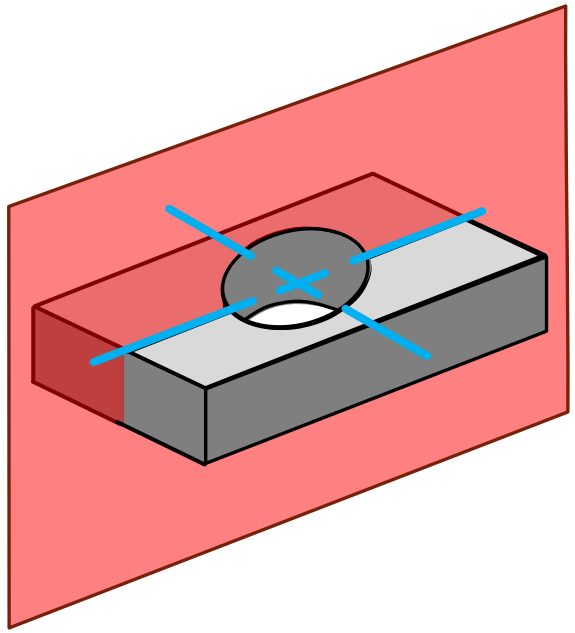


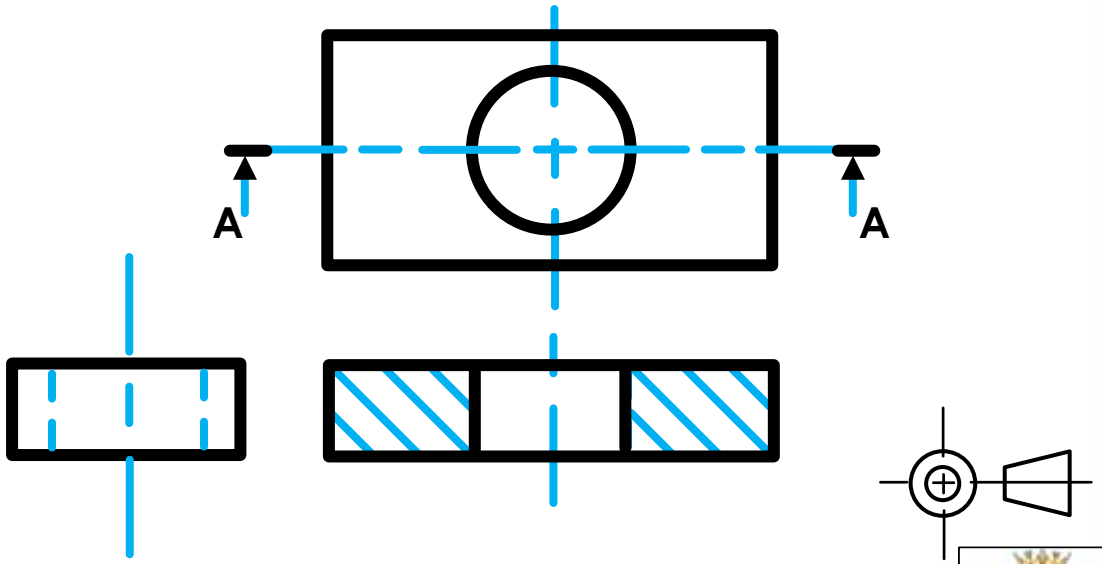




Mechanical Drawings (sectioning)

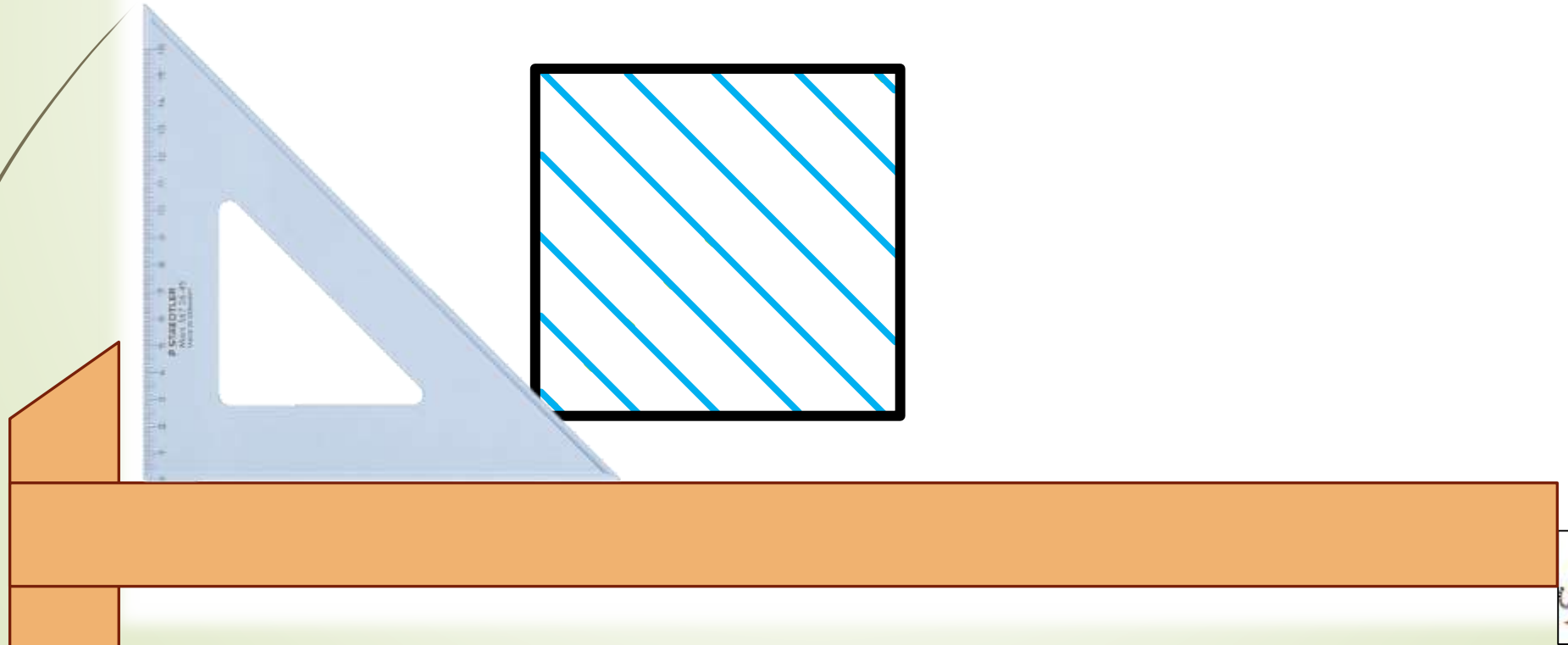
- All solid components that are cut by a cutting plane must be **hatched** with B-type lines (medium line).





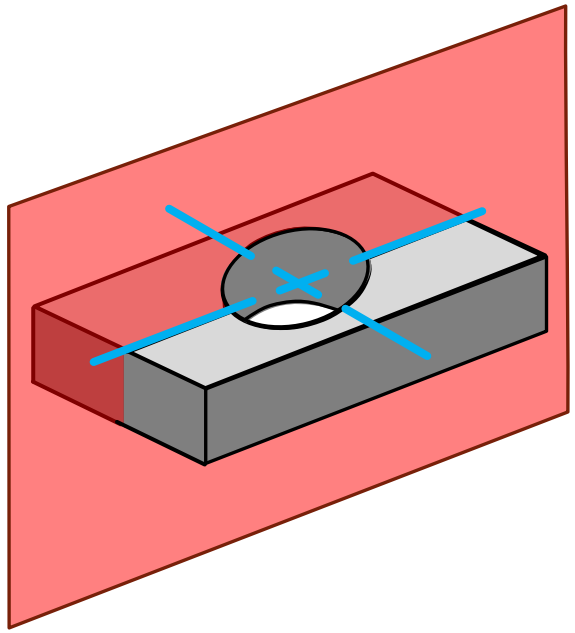
Mechanical Drawings (sectioning)

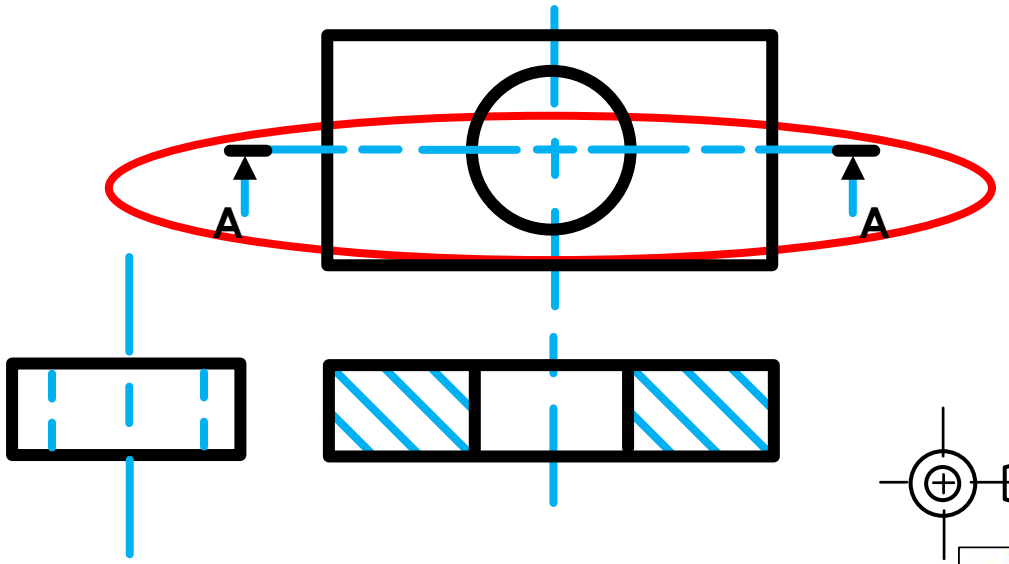
- **Hatching** will always be with **B-type lines (medium line)** which appear **± 5 mm** apart from each other drawn on 45°.

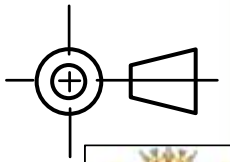


Mechanical Drawings (sectioning)

- The **cutting plane** must be clearly shown on all sectioned drawings.







Mechanical Drawings (sectioning)

- In T.A.O.P. the **cutting plane** is shown in **medium chain-lines** (B-type) of ±20 mm line, ±4 mm gap and ±4 mm line.

T.A.O.P. = Third-Angle Orthographic Projection

Mechanical Drawings (sectioning)

- Medium chain lines will always **start & end** with a **long line.**

Mechanical Drawings (sectioning)

- In **F.A.O.P.** the **cutting plane** is shown as a **solid line**

F.A.O.P. = First-Angle Orthographic Projection

Mechanical Drawings (sectioning)

- The cutting plane line must be **emphasised** at both **ends**.

F.A.O.P. = First-Angle Orthographic Projection

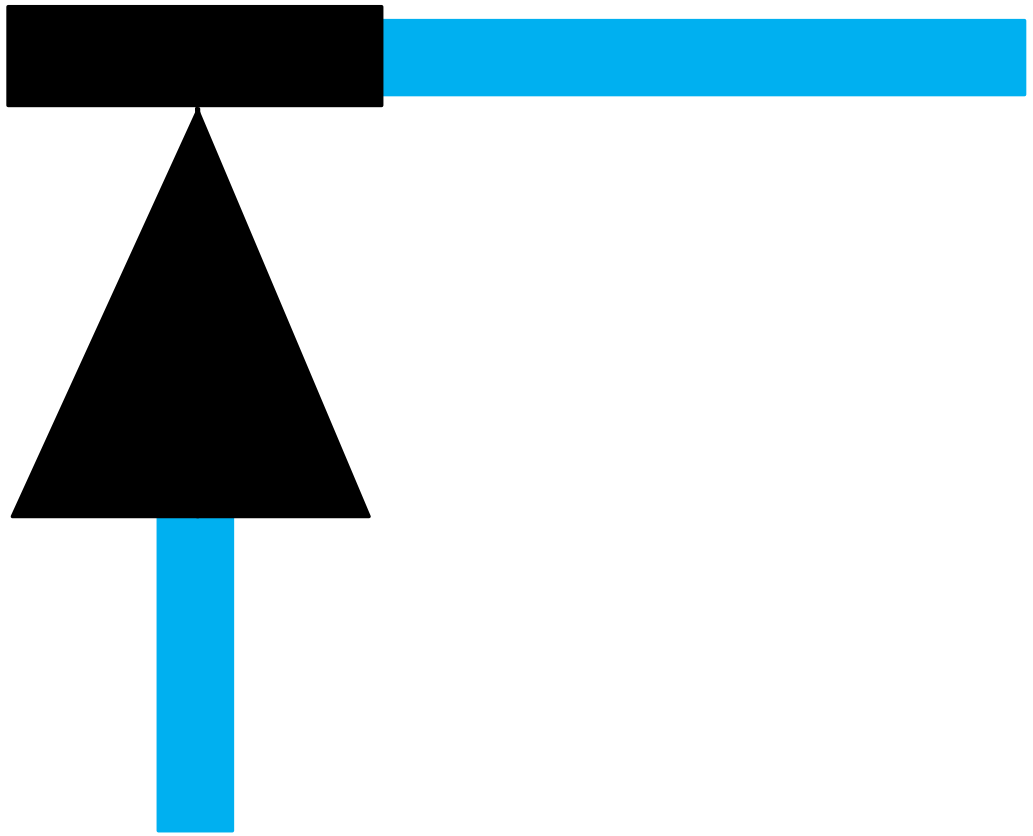
T.A.O.P. = Third-Angle Orthographic Projection

Mechanical Drawings (sectioning)

- The **arrows** of the cutting plane is larger that dimension arrows.

F.A.O.P. = First-Angle Orthographic Projection

T.A.O.P. = Third-Angle Orthographic Projection

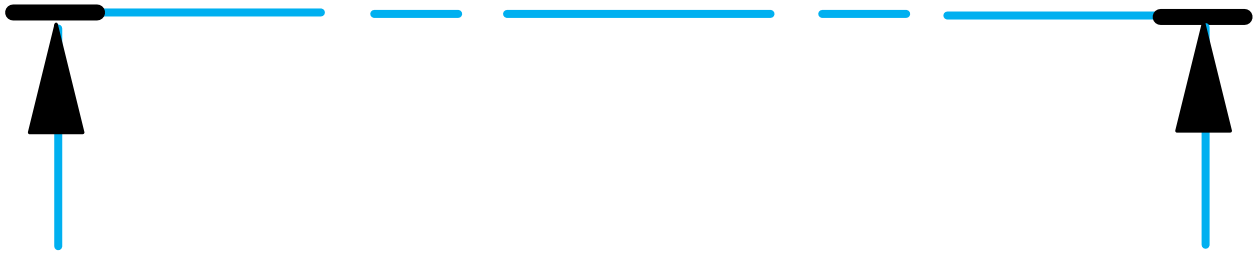


Mechanical Drawings (sectioning)

- The **tail** part of the arrows must be B type line quality.

F.A.O.P. = First-Angle Orthographic Projection

T.A.O.P. = Third-Angle Orthographic Projection

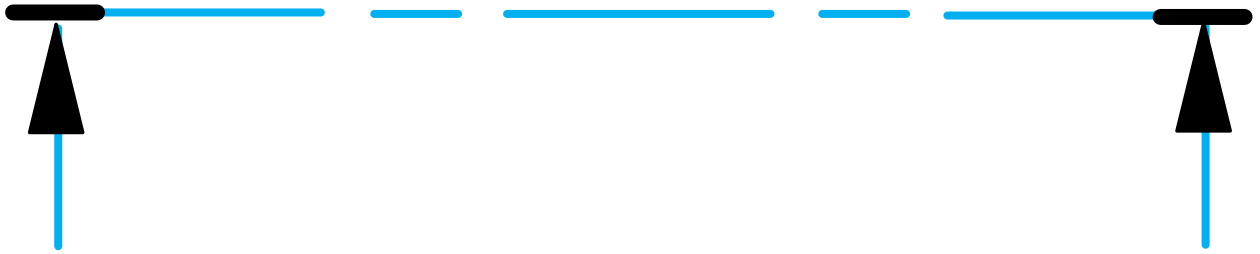


Mechanical Drawings (sectioning)

- The **arrows** on the cutting plane will **point** towards the **remaining portion** of the object.

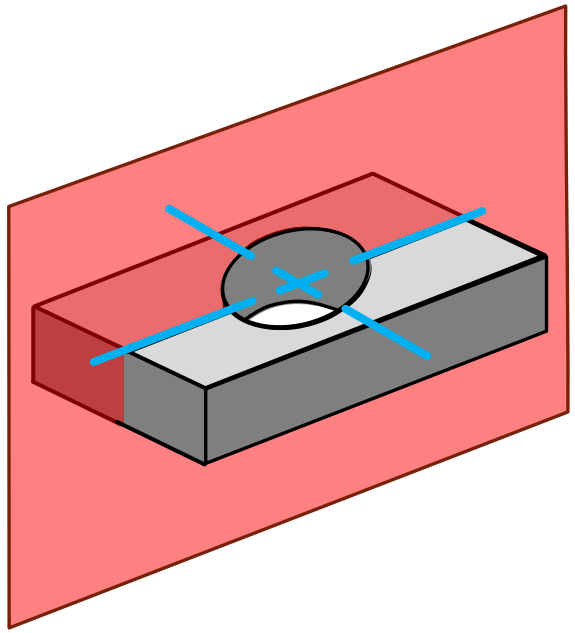
F.A.O.P. = First-Angle Orthographic Projection

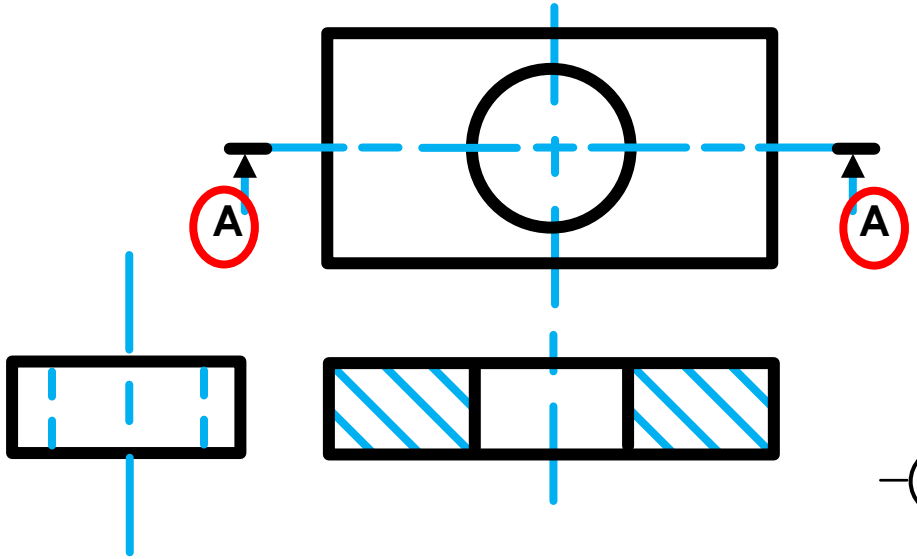
T.A.O.P. = Third-Angle Orthographic Projection

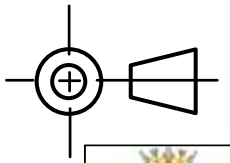


Mechanical Drawings (sectioning)

- The cutting plane will normally be **named** after letters of the alphabet (e.g. AA).

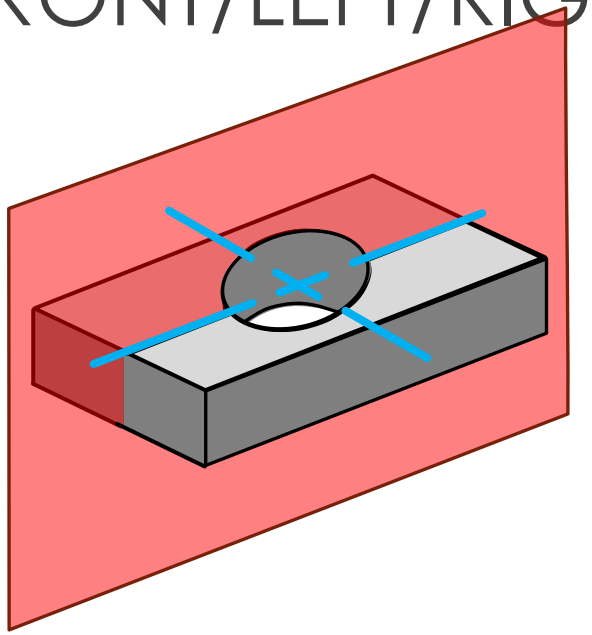


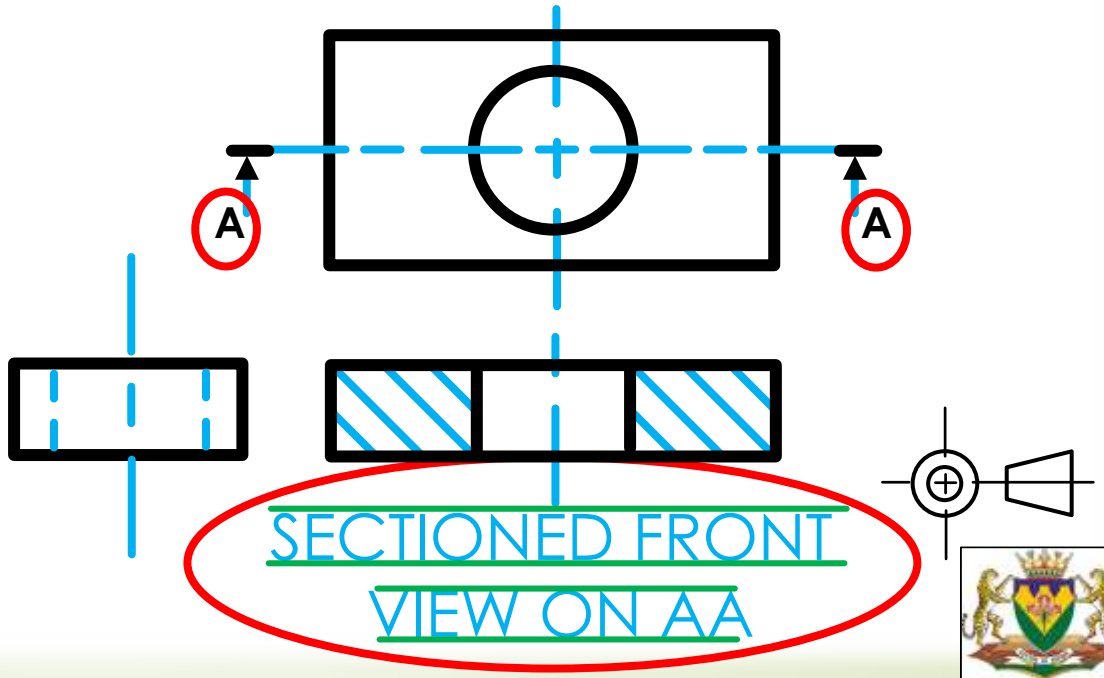




Mechanical Drawings (sectioning)

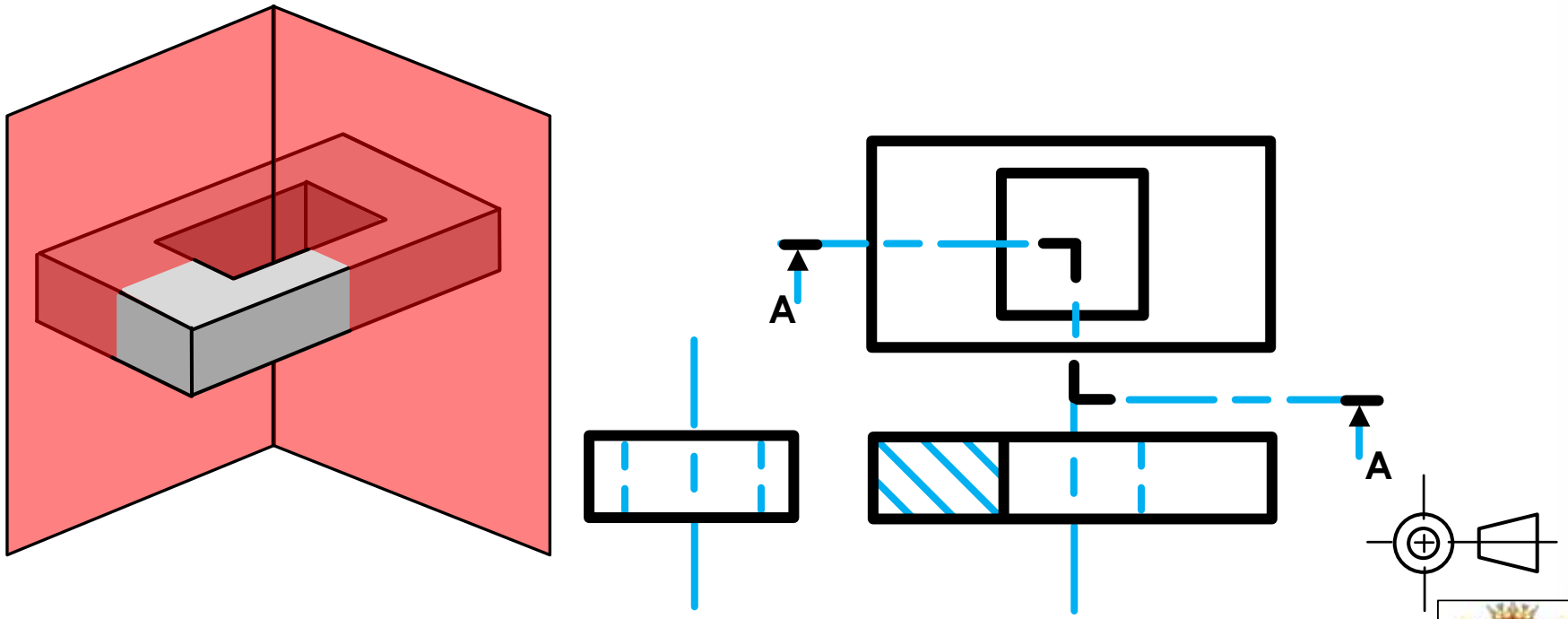
- The view which is cut (sectioned) because of the cutting plane (e.g. AA) will be named after the cutting plane: e.g. **SECTIONED** FRONT/LEFT/RIGHT **VIEW ON AA**





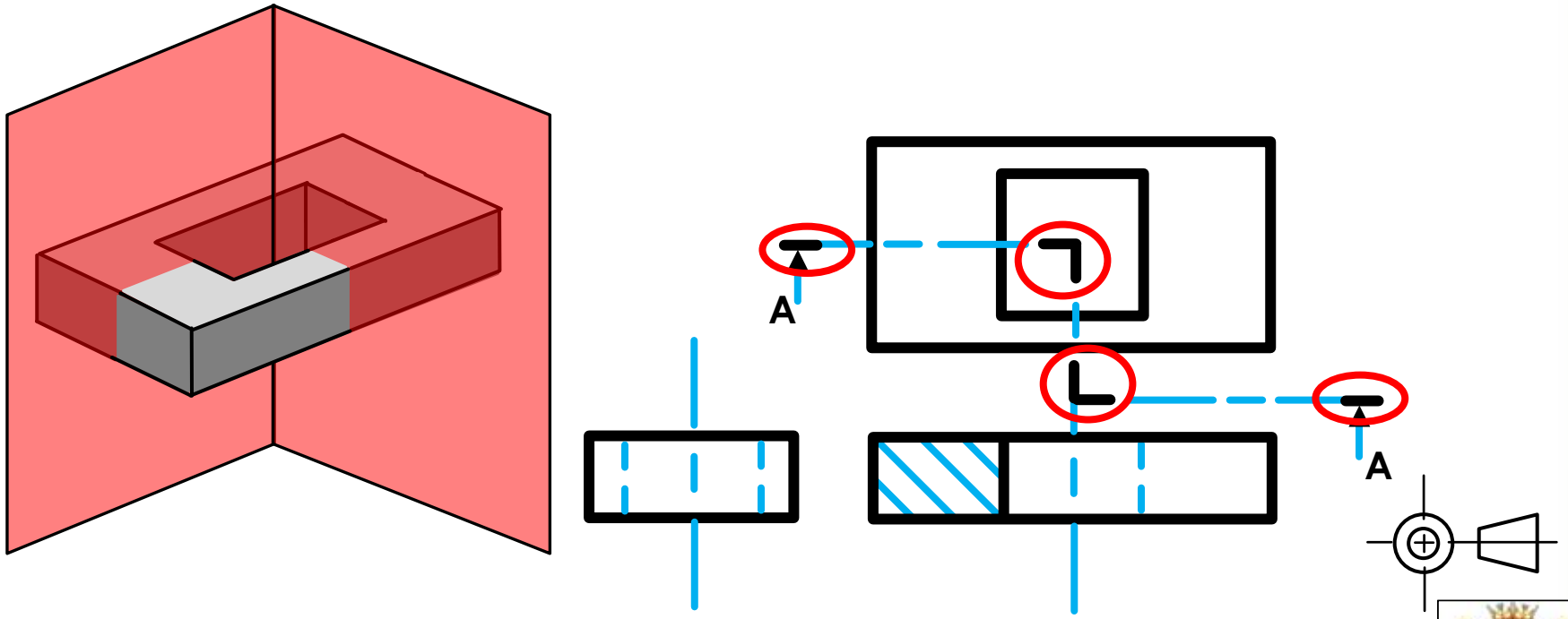
Mechanical Drawings (sectioning)

- The **cutting plane** can also **bend** to show a half sectioned area.



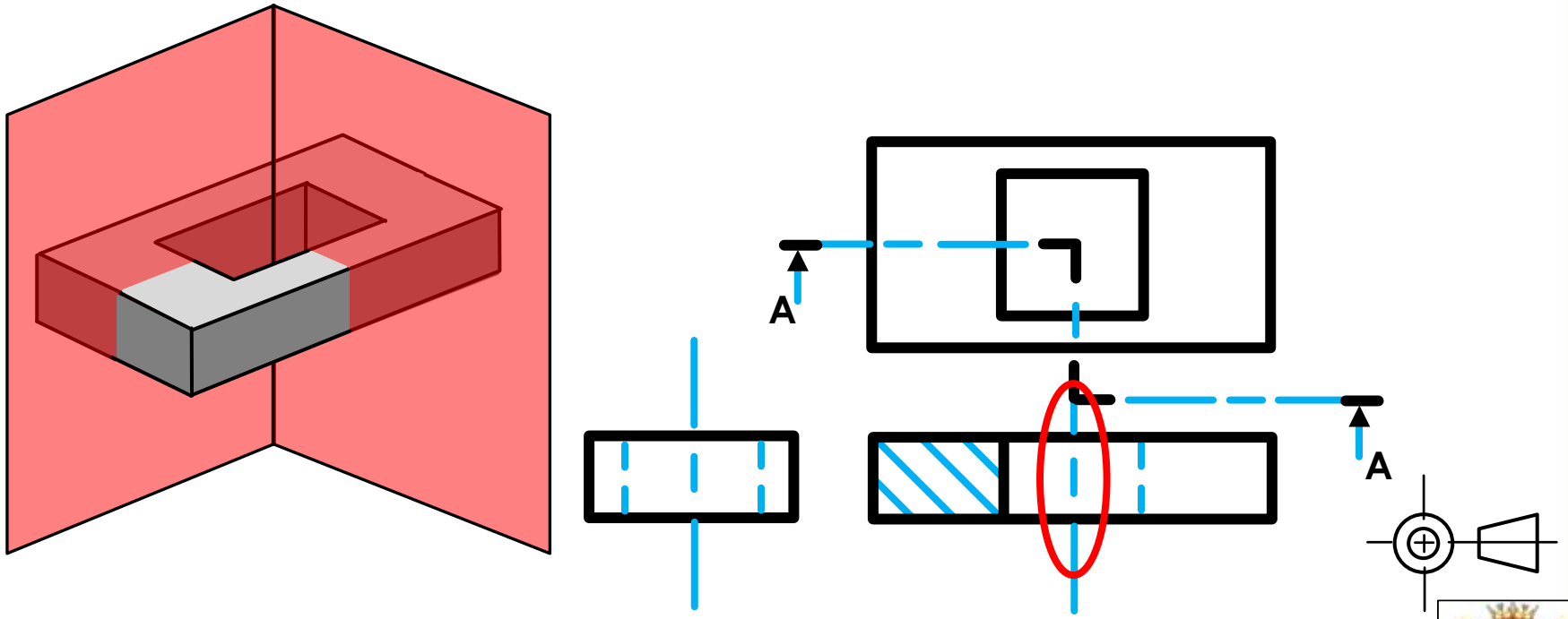
Mechanical Drawings (sectioning)

- The **cutting plane** must be **emphasised** at all **bends** and **ends**.



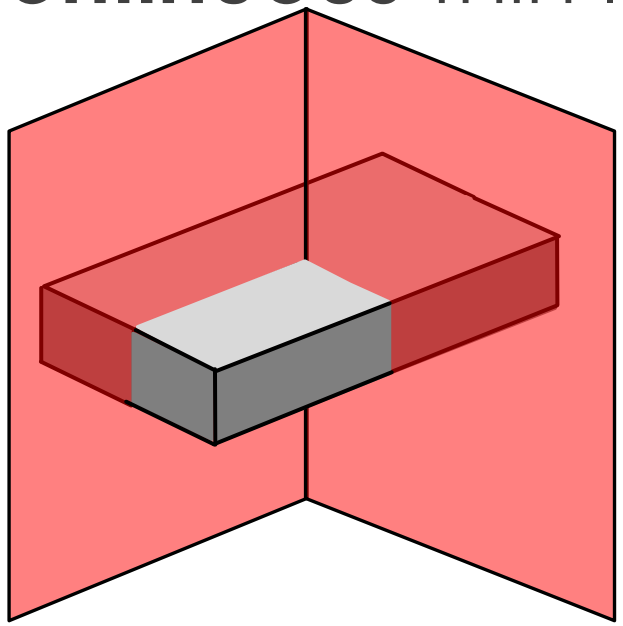
Mechanical Drawings (sectioning)

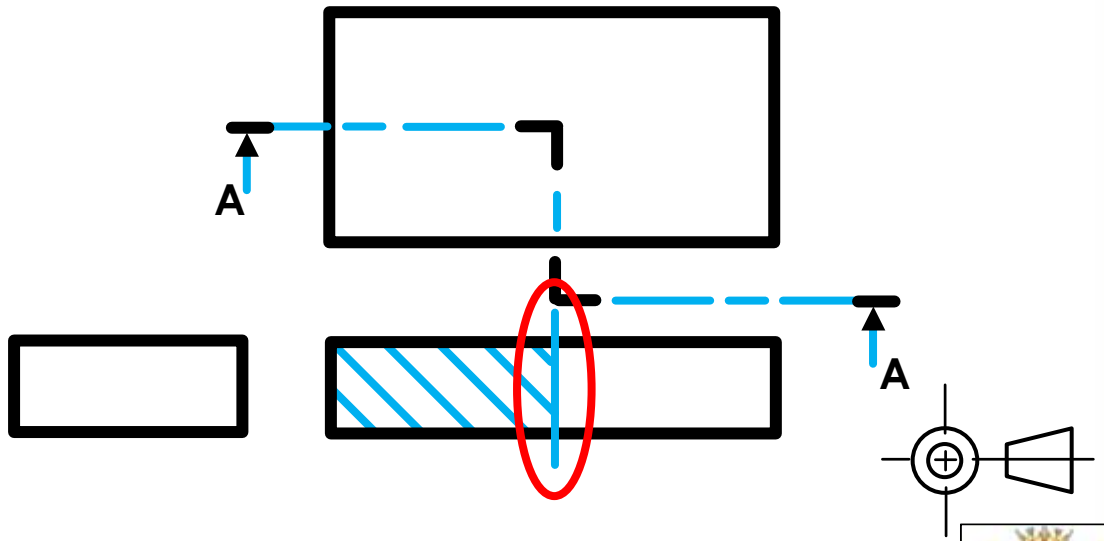
- When the sectioned half of the view contains **a hollow area** towards the centre point, a **centre line** should be indicated.



Mechanical Drawings (sectioning)

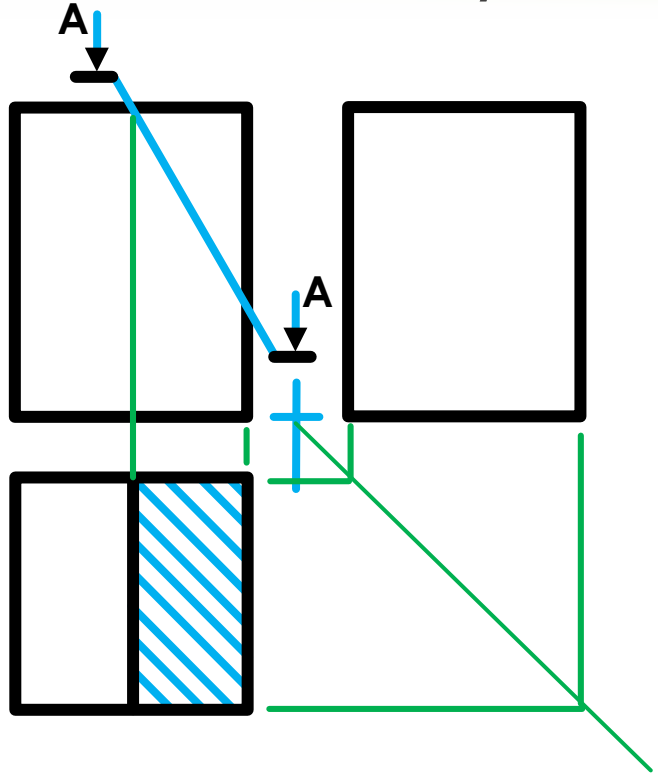
- When the sectioned half of the view contains **a solid area** towards the centre point, the centre line should be **changed to a continuous** thin line.





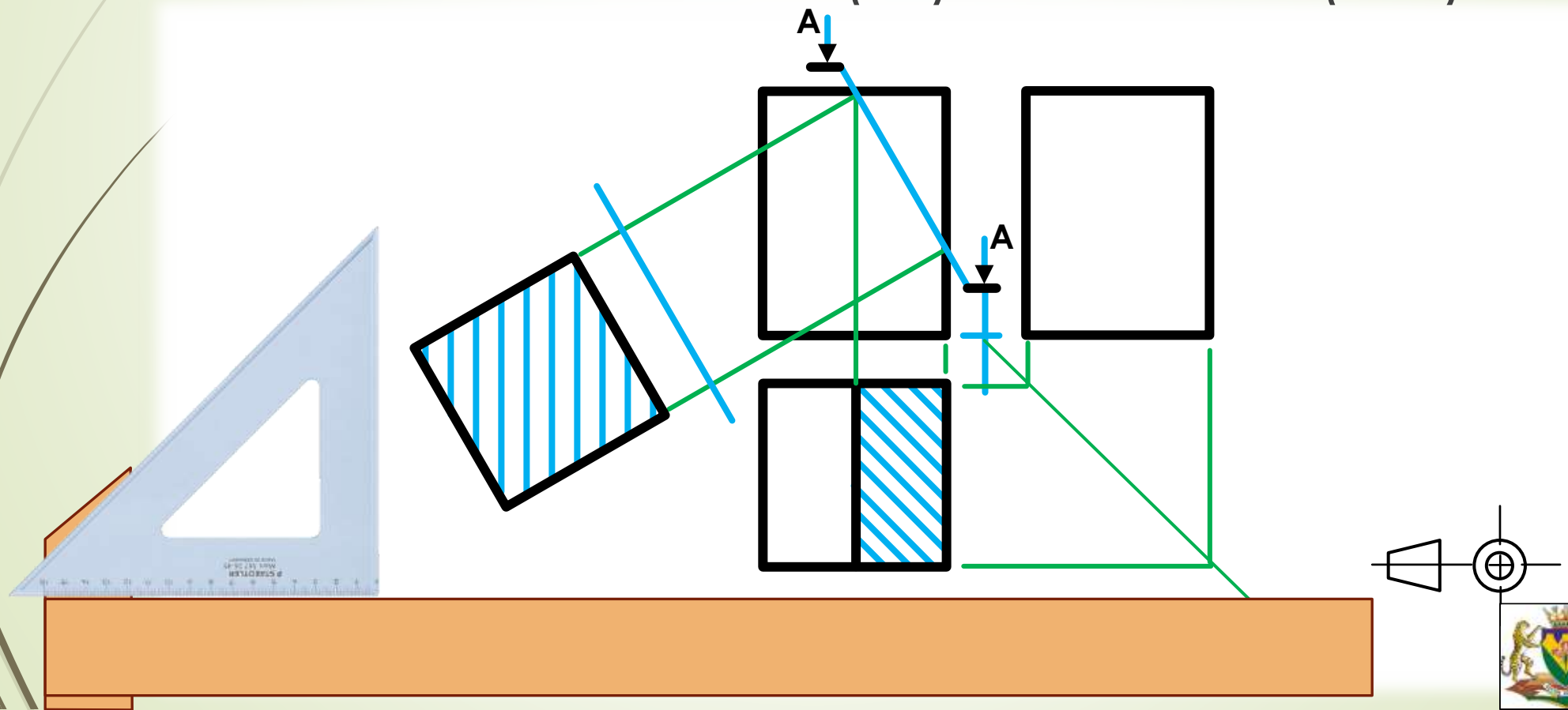
Mechanical Drawings (sectioning)

- If the **sectioned object appear predominantly vertical**, all hatching lines will be diagonal in 45° B-type lines (medium line).



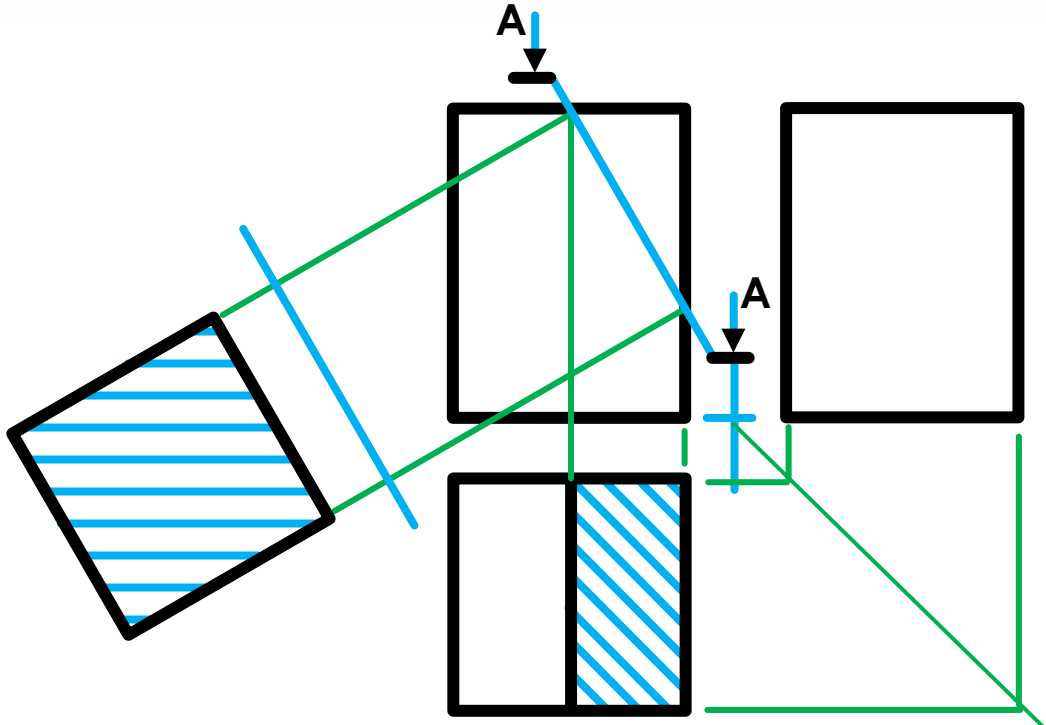
Mechanical Drawings (sectioning)

- Should a **sectioned object appear predominantly diagonal**, all hatching lines will be either horizontal (0°) or vertical (90°).



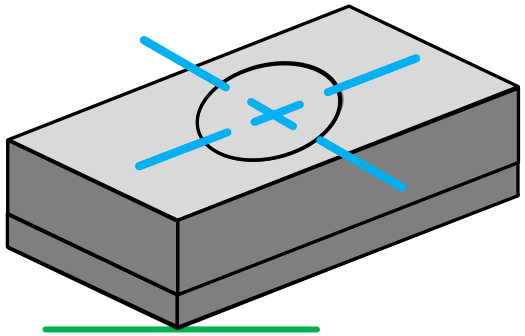
Mechanical Drawings (sectioning)

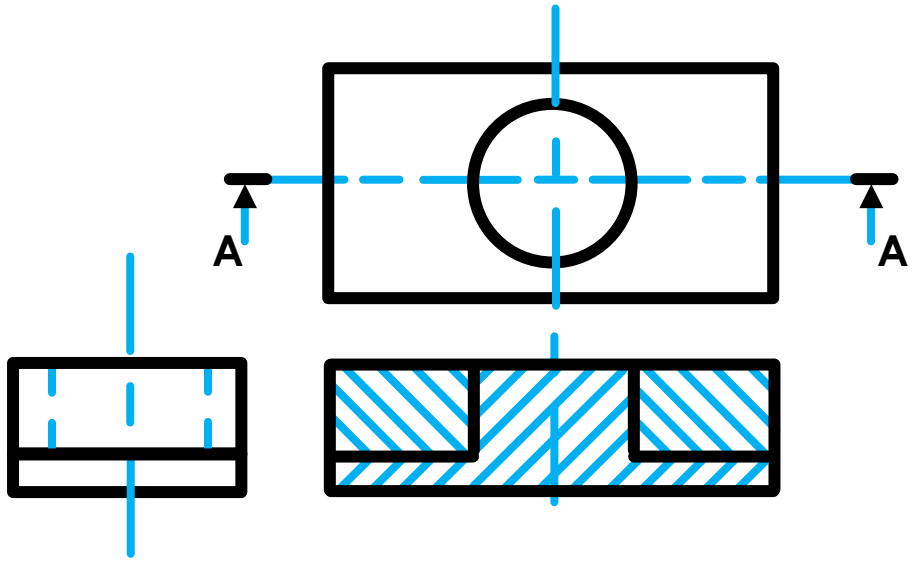
- Should a **sectioned object appear predominantly diagonal**, all hatching lines will be either horizontal (0°) or vertical (90°).

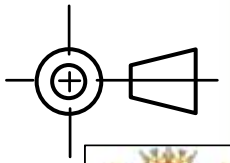


Mechanical Drawings (sectioning)

- **Hatch lines** of **two components** next to each other must alternate in direction to indicate the difference in components.

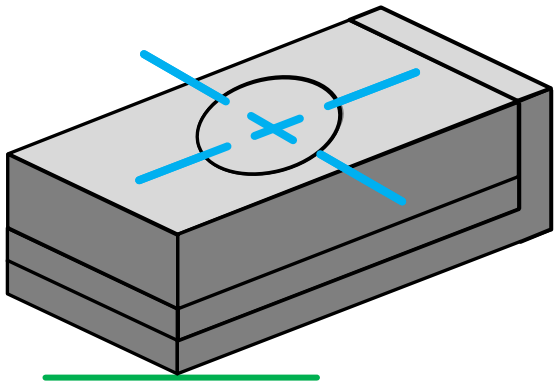


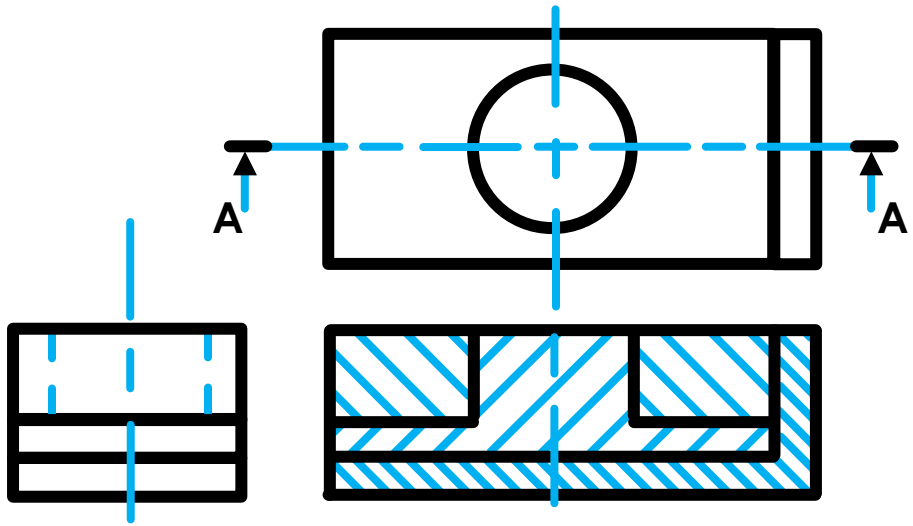


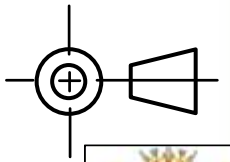


Mechanical Drawings (sectioning)

- **Hatch lines** of **three components** next to each other must alternate in direction while the hatch lines of the smallest component can be drawn to a smaller distance apart from each other.

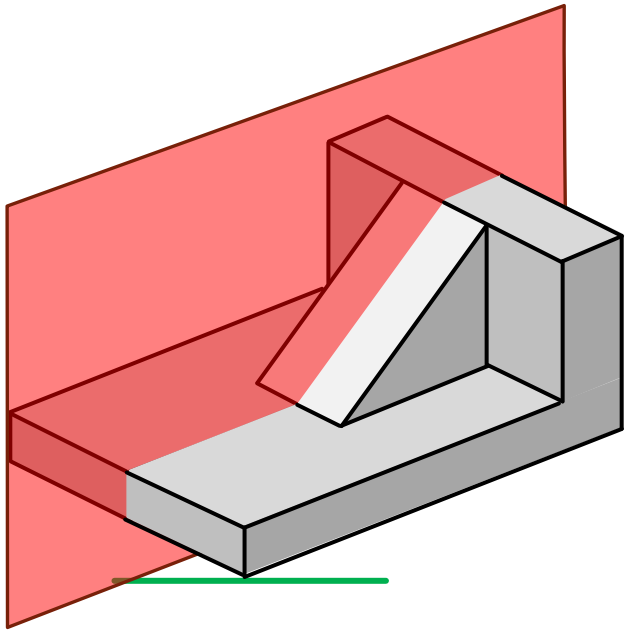


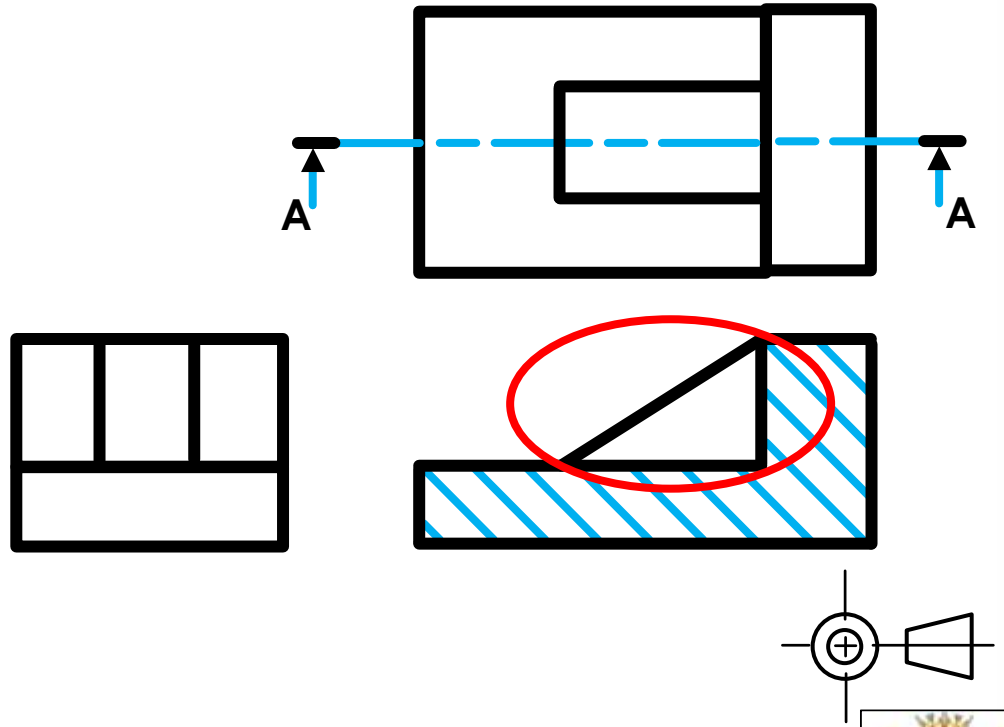




Mechanical Drawings (sectioning)

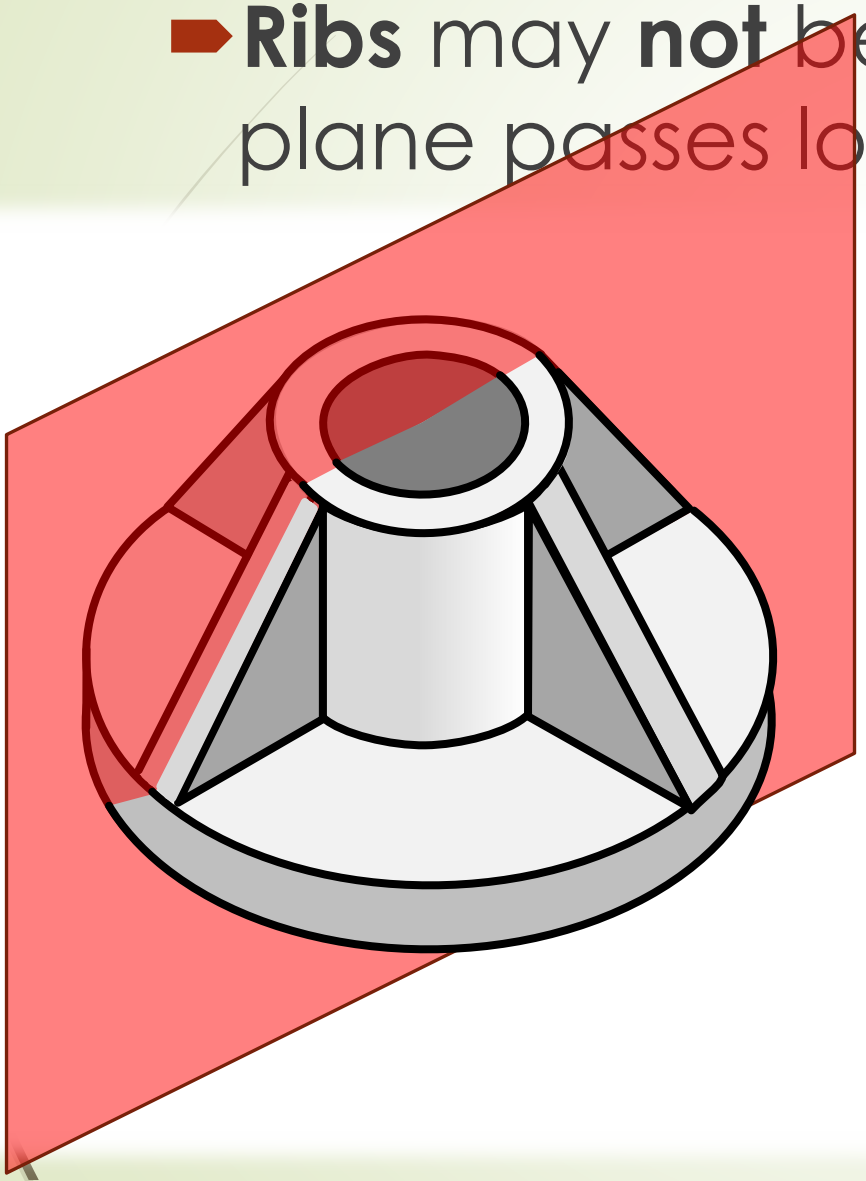
- A **reinforced rib** may be sectioned, but **NO** hatching must be shown when the cutting plane passes longitudinally through it.

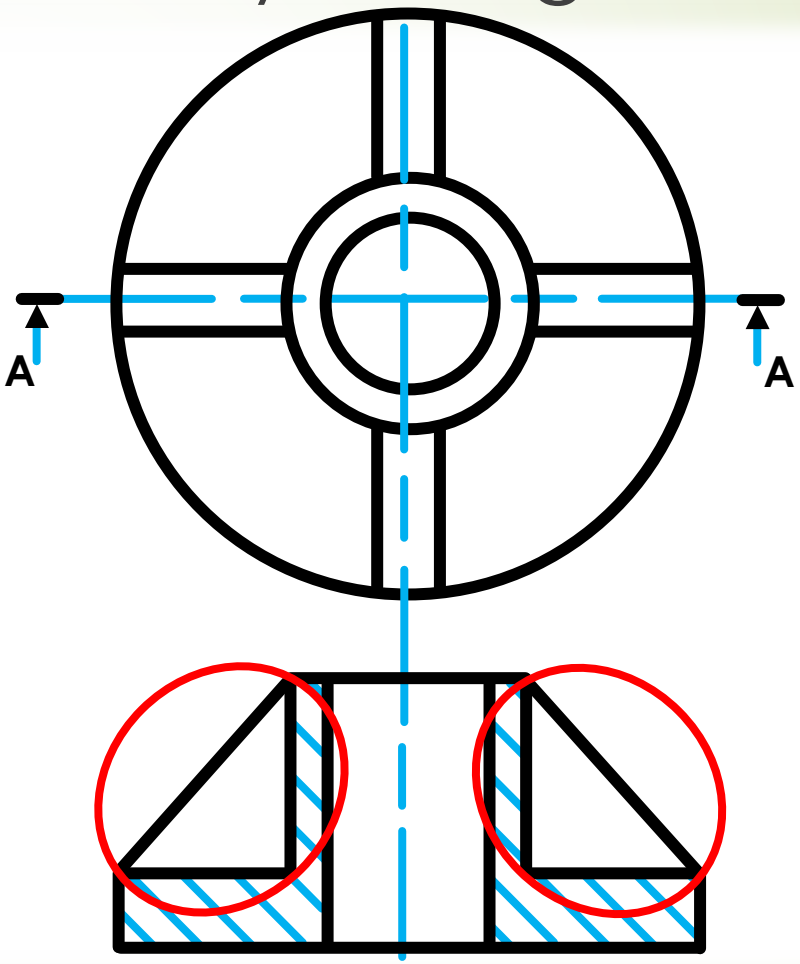




Mechanical Drawings (sectioning)

- **Ribs** may **not** be sectioned when the cutting plane passes longitudinally through them.





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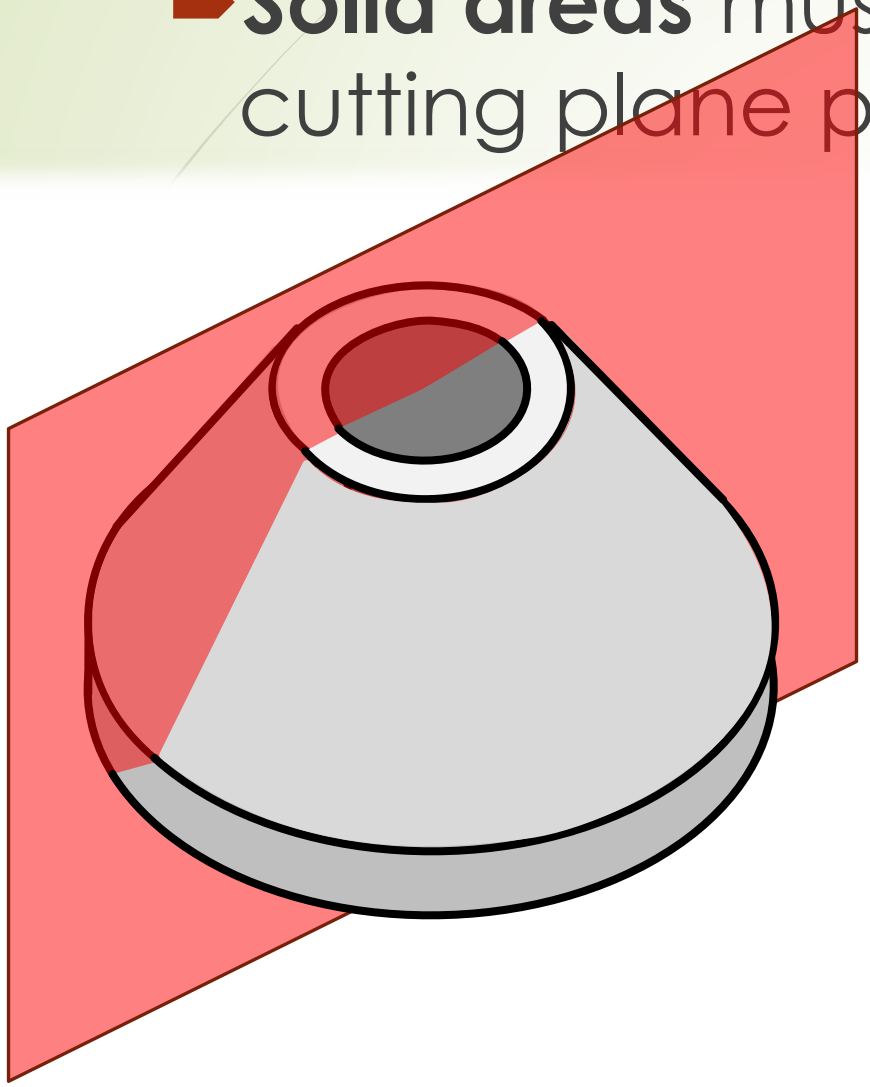
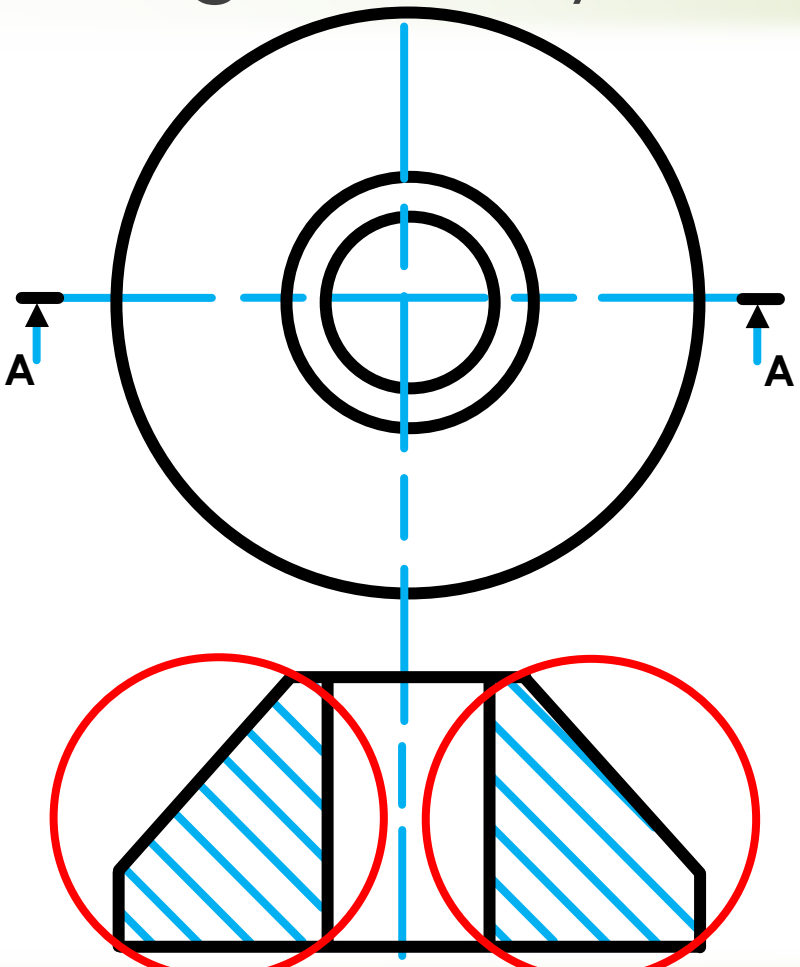
Mechanical Drawings (sectioning)

- **Solid areas** must be sectioned when the cutting plane passes longitudinally through it.





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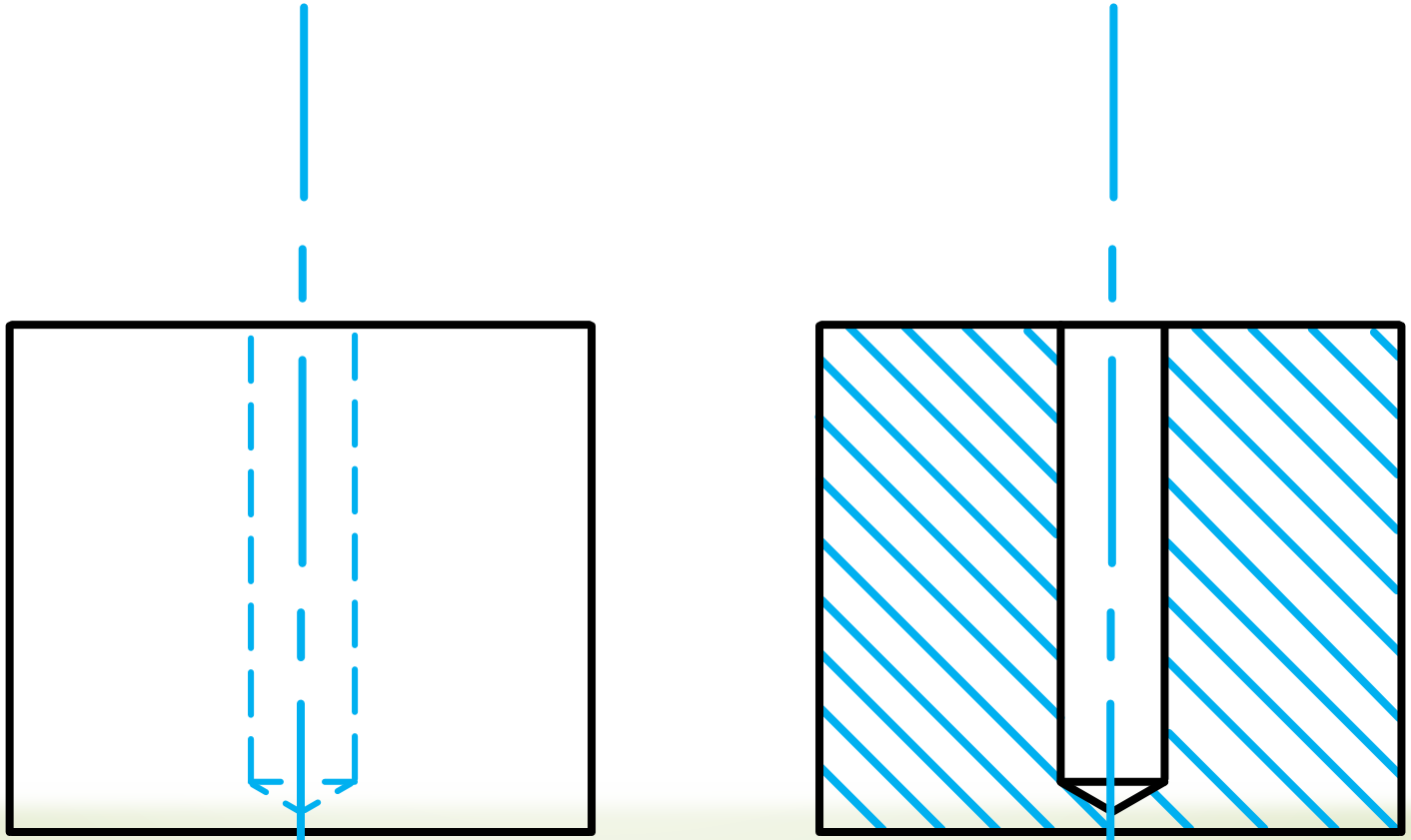
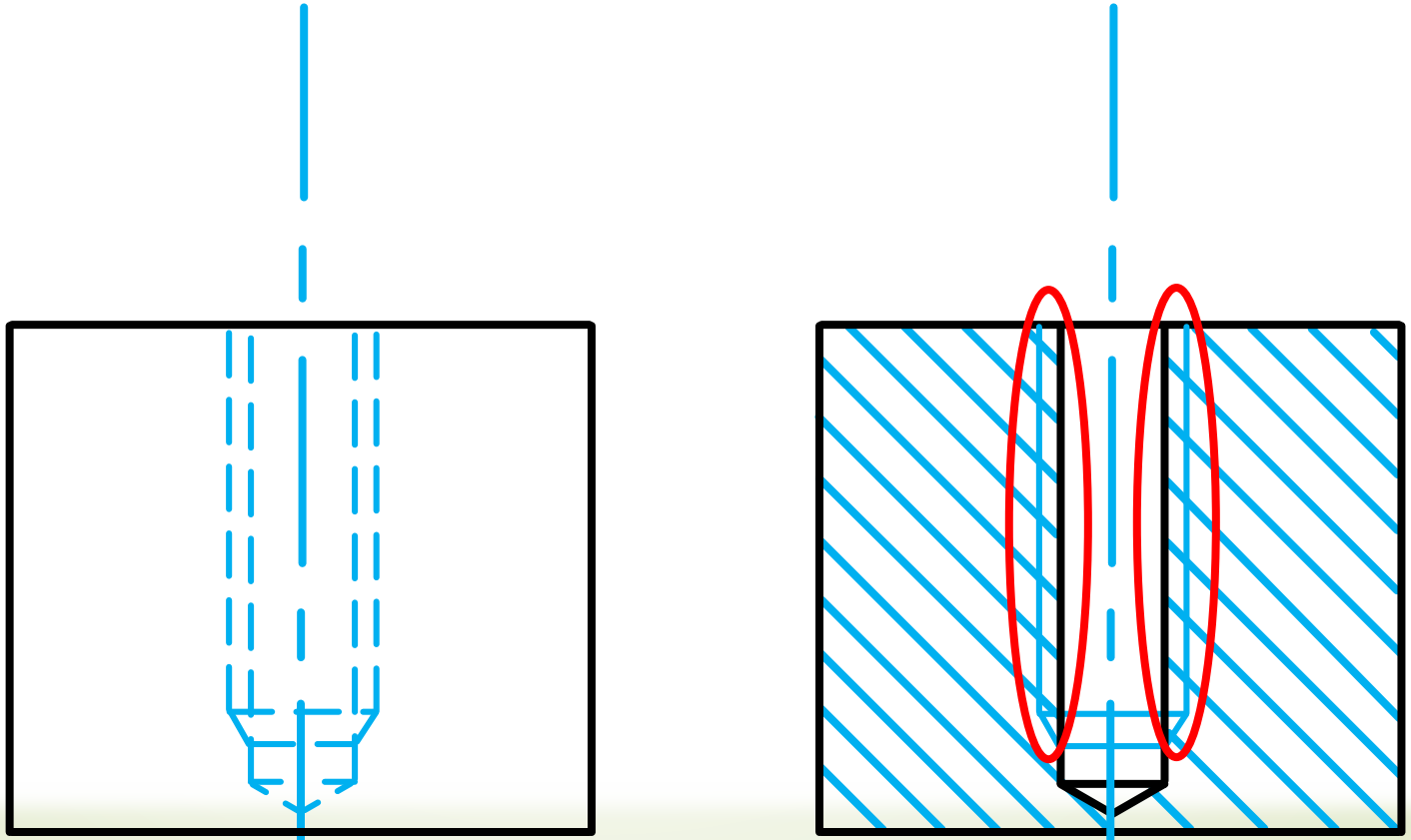
Mechanical Drawings (sectioning)

- Hatching of an internal hole.



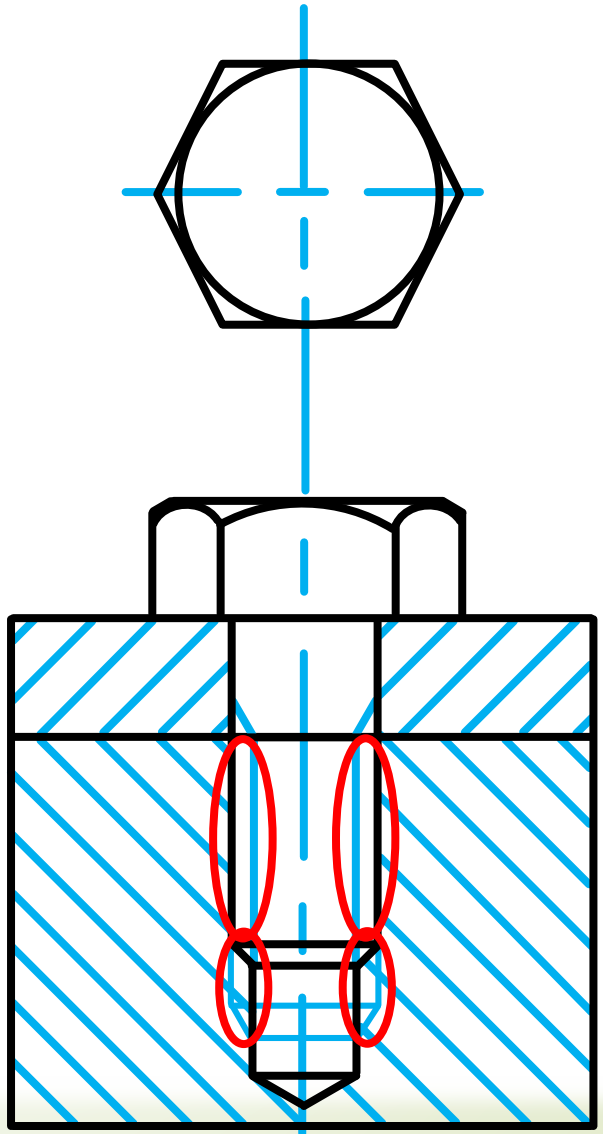
Mechanical Drawings (sectioning)

- Hatching of an internal hole with threat.



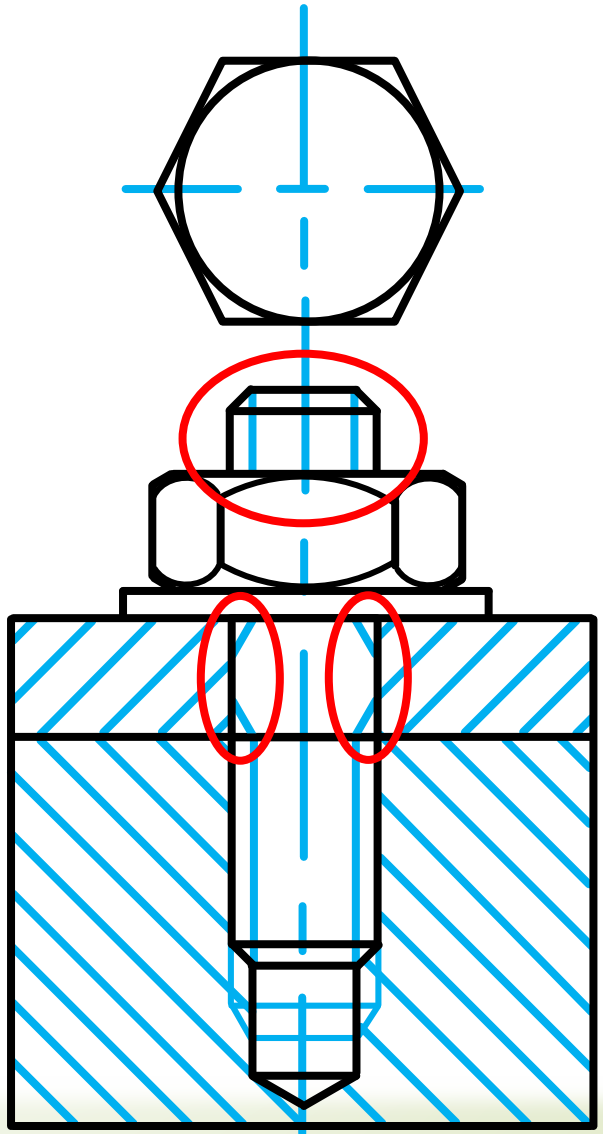
Mechanical Drawings (sectioning)

- Hatching of an internal hole including a threat and a bolt.



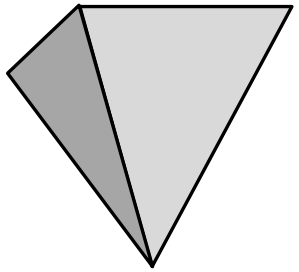
Mechanical Drawings (sectioning)

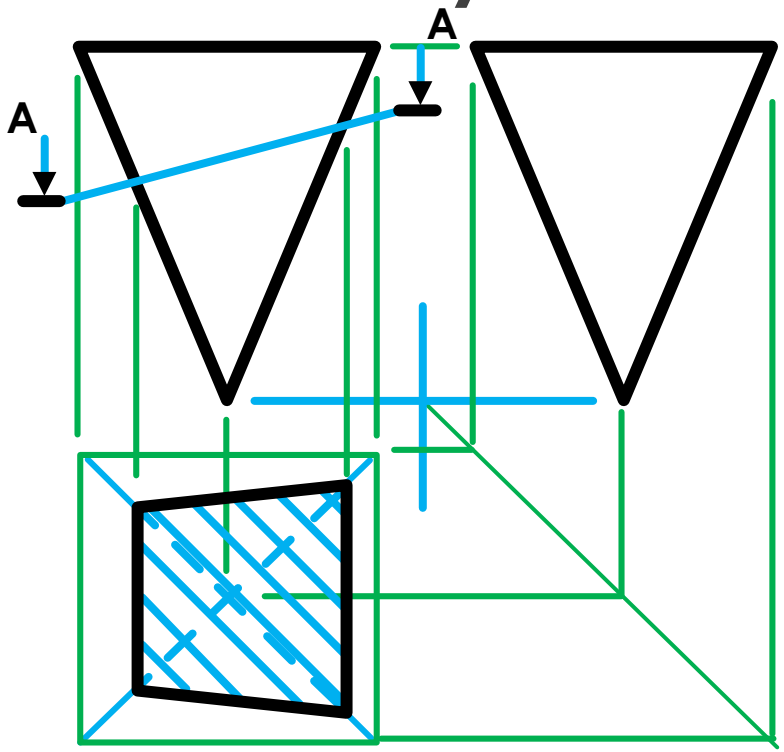
- Hatching an internal hole including a threat, washer, nut and a stud.

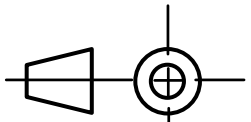


Mechanical Drawings (sectioning and hidden detail)

- **Hidden detail** should also be shown **behind hatching** when **necessary for clarity**.

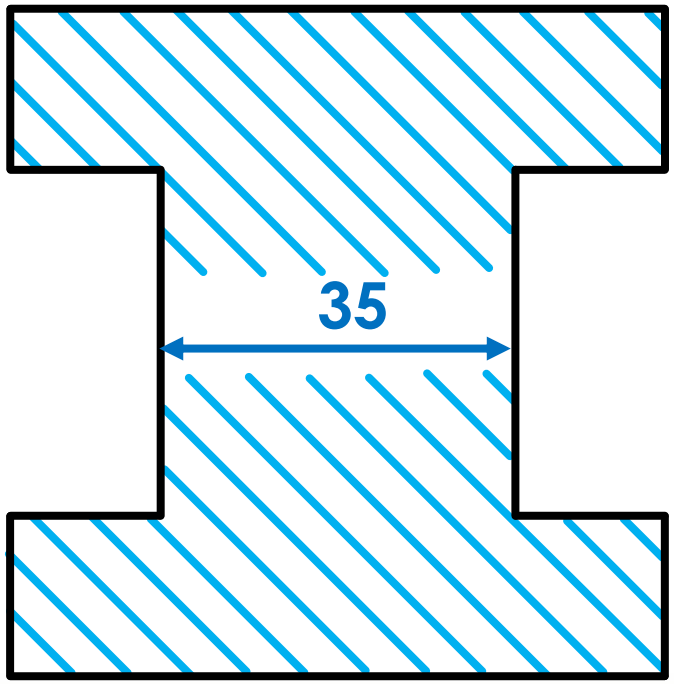






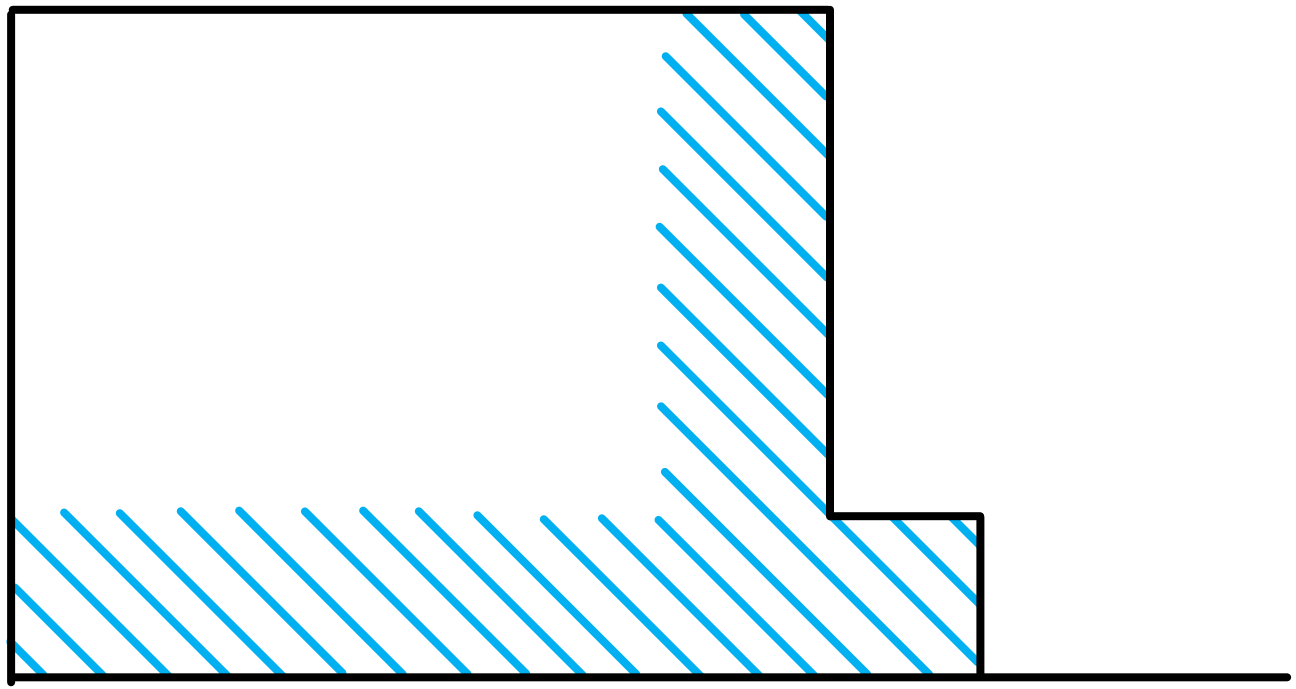
Mechanical Drawings (sectioning)

- Hatching may be interrupted for dimensions and lettering.



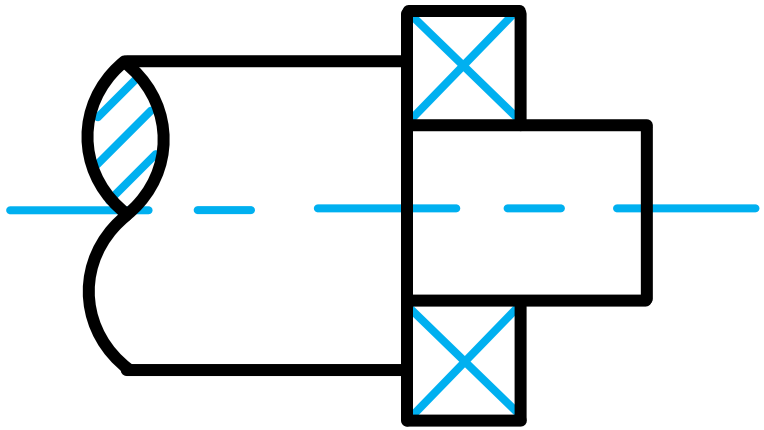
Mechanical Drawings (sectioning)

- In the case of a large area, the hatching may be limited to a zone following the outline of the area



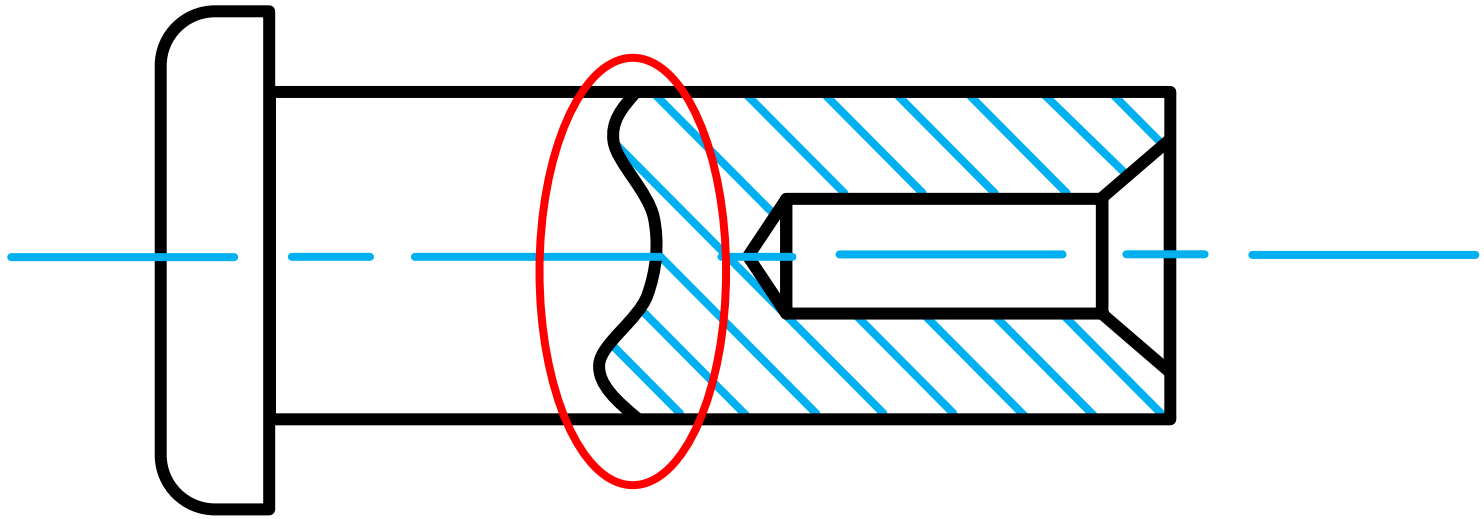
Mechanical Drawings (sectioning)

- Indication of a bearing.



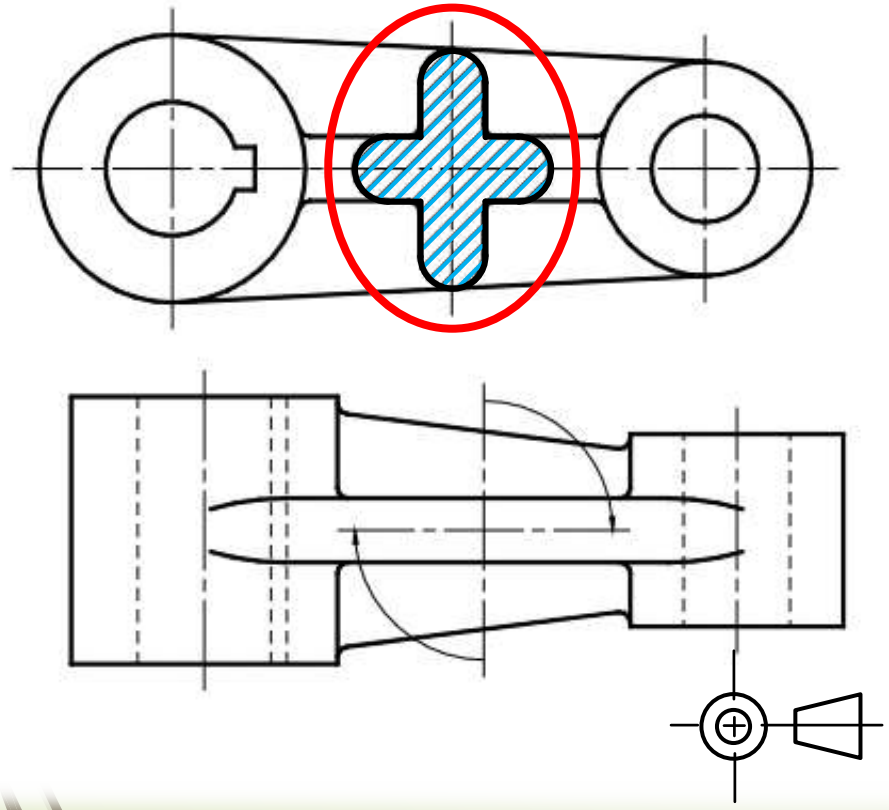
Mechanical Drawings (sectioning)

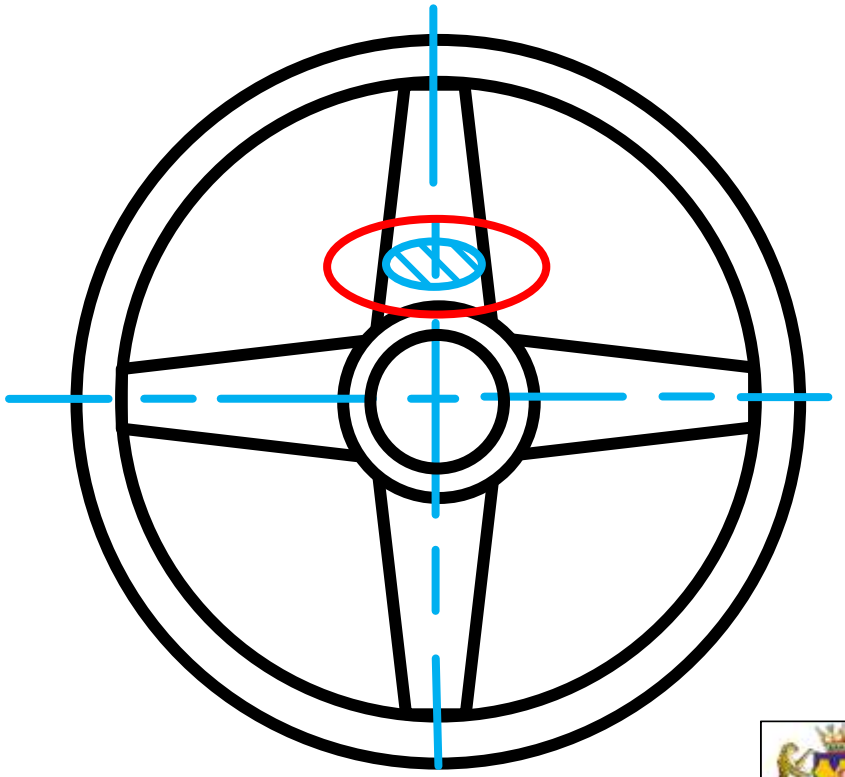
- A view may be drawn in **part section** to show detail that would otherwise be hidden



Mechanical Drawings (sectioning)

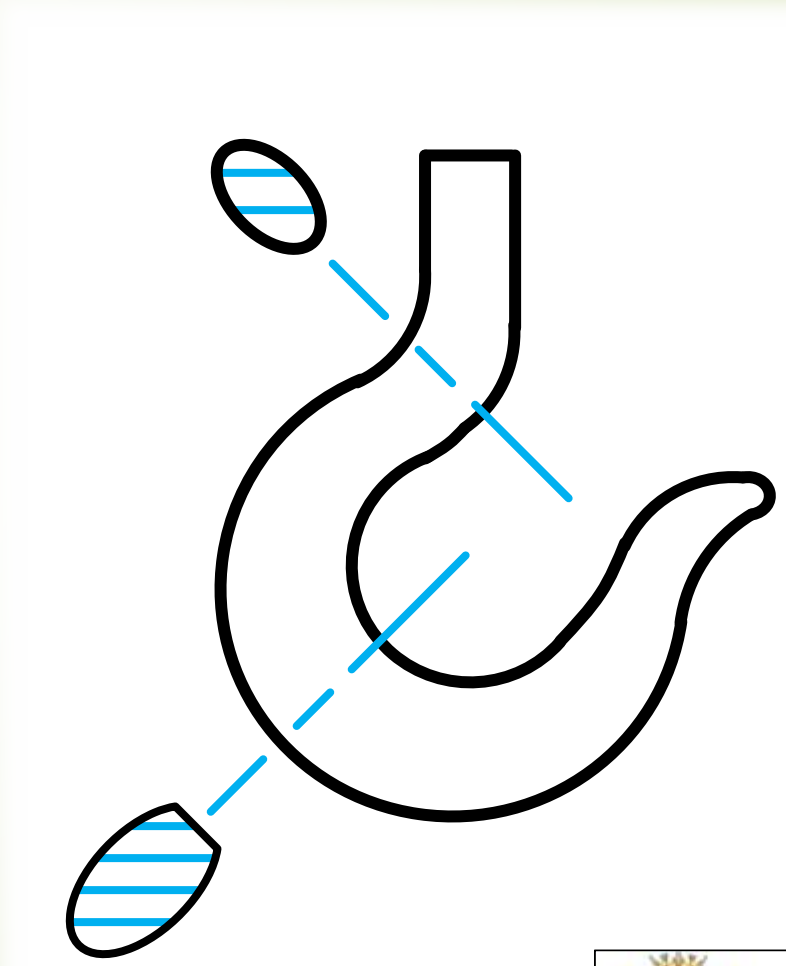
- A **revolved section** is used to show the **shape** of a cross-section by revolving the cutting plane in position.





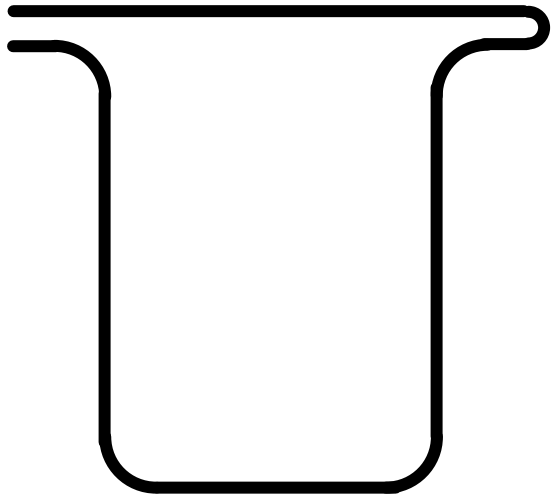
Mechanical Drawings (sectioning)

- A **removed section** show the **shape** of the cross-section placed near the view and, if applicable, connected with the view by its line of symmetry (thin chain line) through the cutting plane.



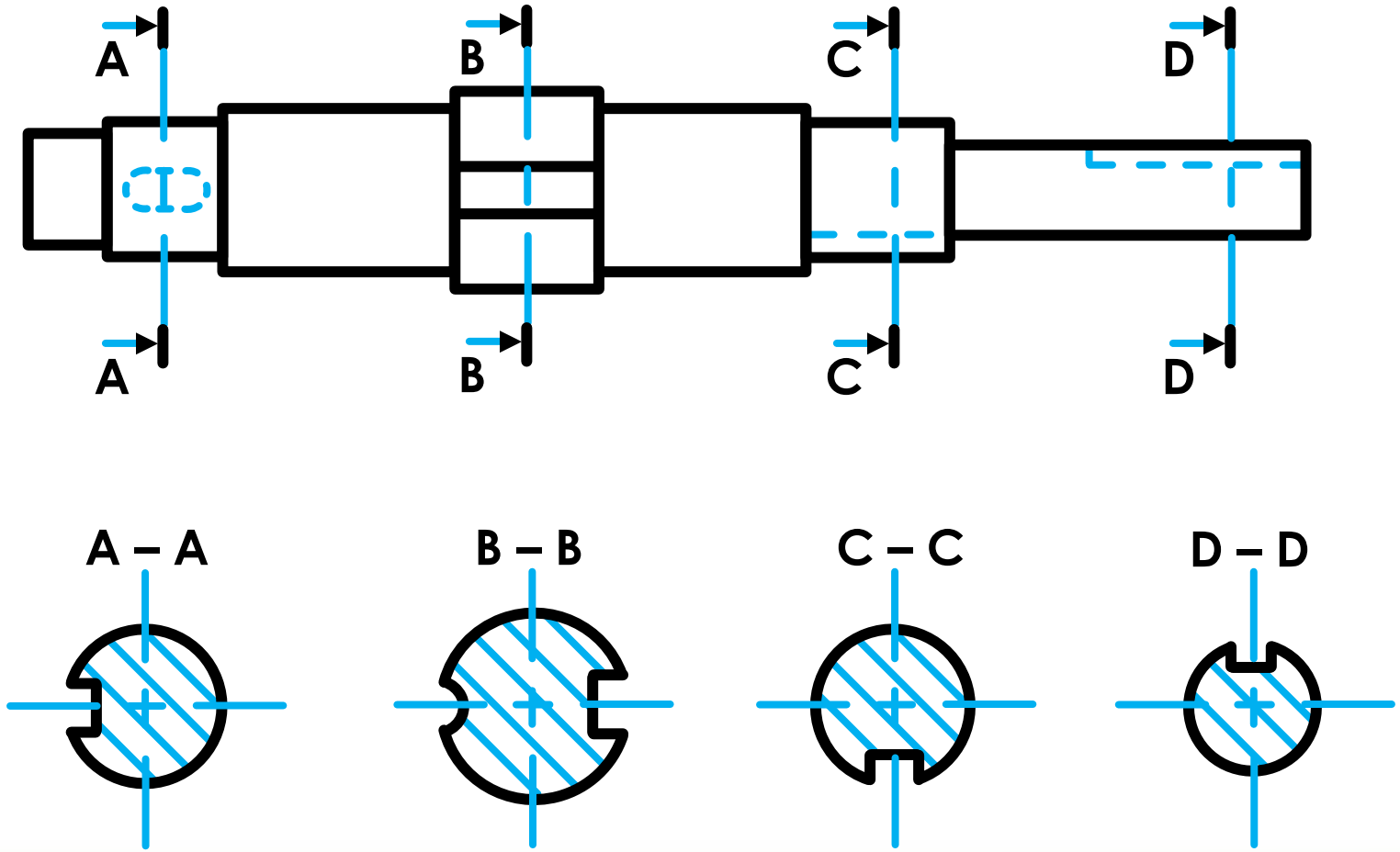
Mechanical Drawings (sectioning)

- Sections of components that are **too thin** for hatching may be blackened (i.e. filled in solid), and a space left between adjacent components.



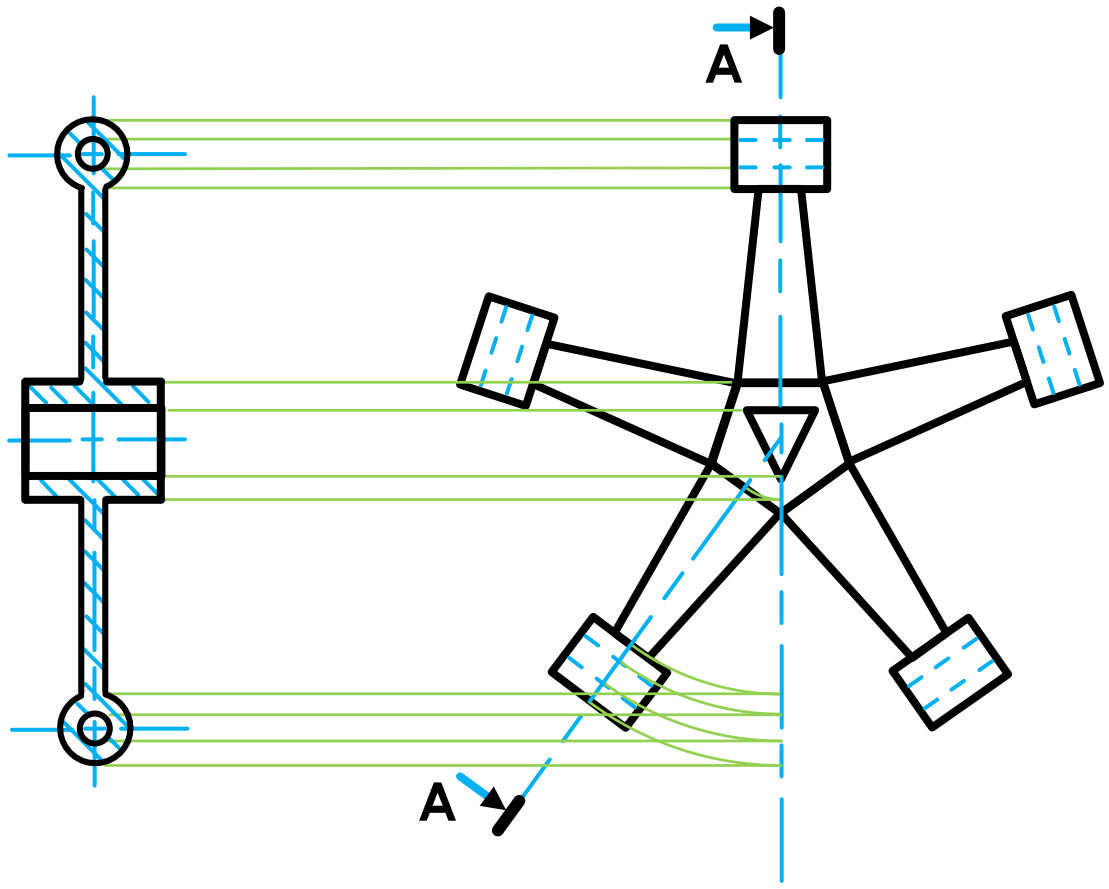
Mechanical Drawings (sectioning)

- Successive sections



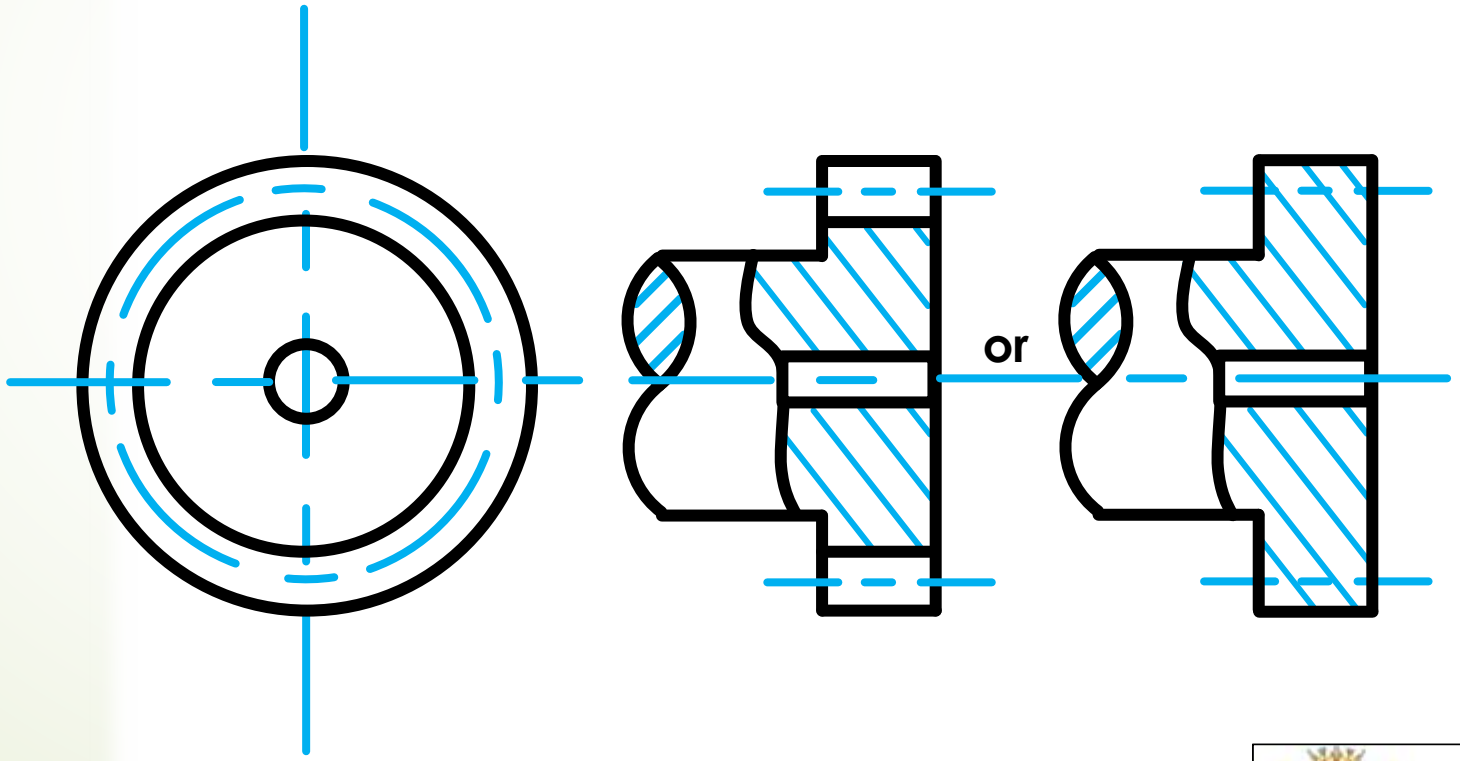
Mechanical Drawings (sectioning)

- Aligned sections



PRESENTATION OF COMMON FEATURES

- The conventional representation of a gear.
  - Equal number of teeth.



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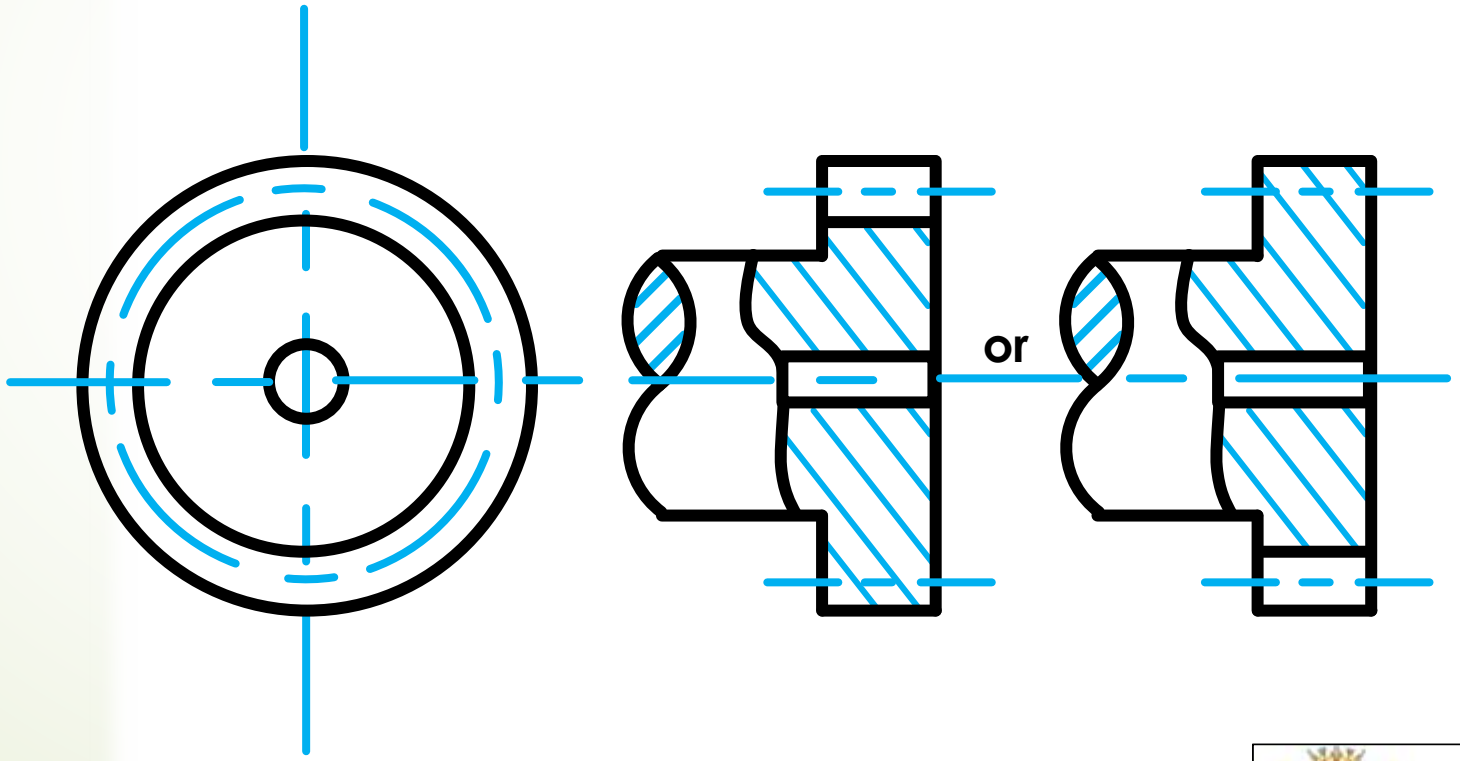
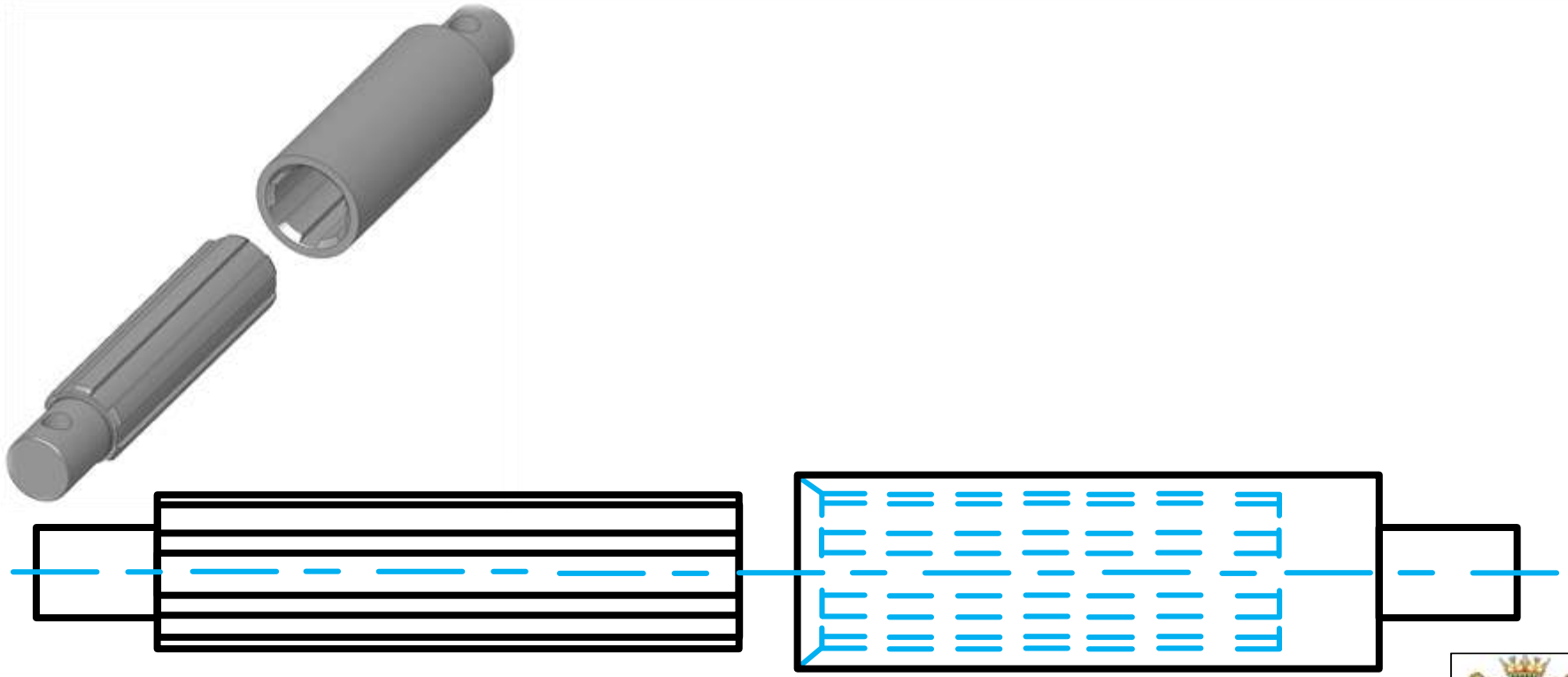


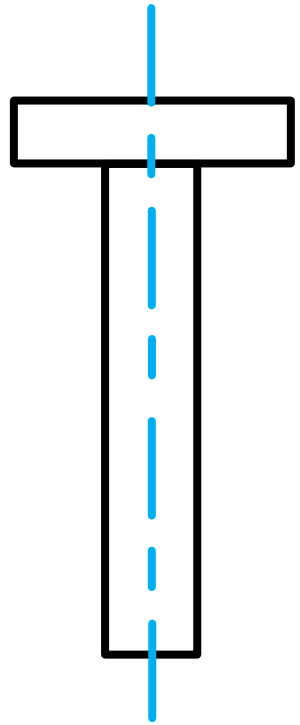
Mechanical Drawings (sectioning)

- A **shaft** may **not** be sectioned when the cutting plane passes longitudinally through it.



Mechanical Drawings (sectioning)

- **Rivets** may **not** be sectioned when the cutting plane passes longitudinally through them.

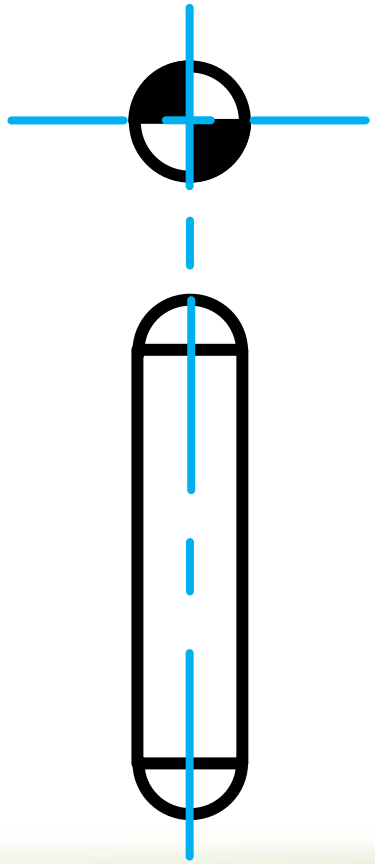


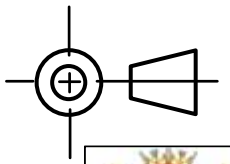
Mechanical Drawings (sectioning)

- **Rods of any kind** may **not** be sectioned when the cutting plane passes longitudinally through them.

Mechanical Drawings (sectioning)

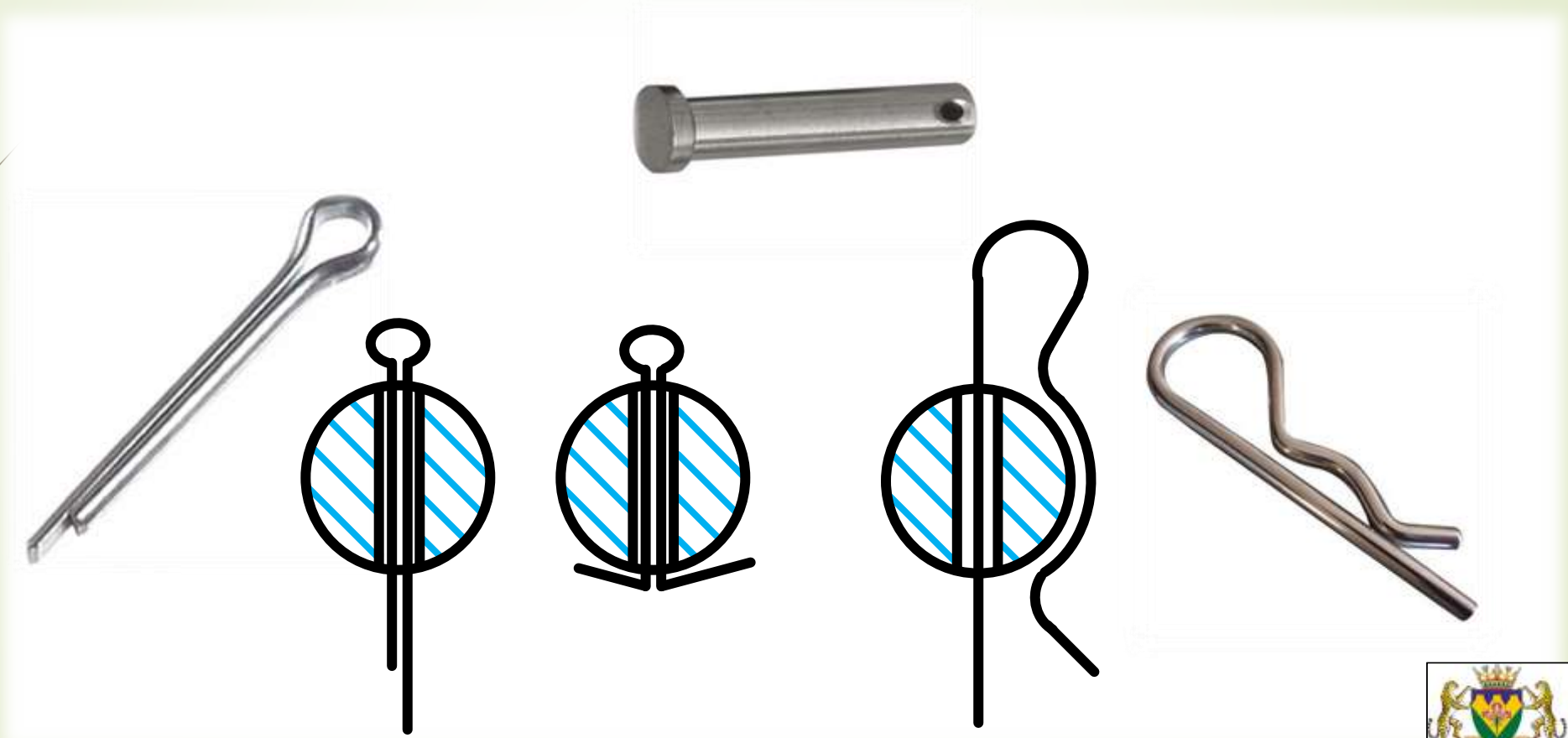
- **Dowels** may **not** be sectioned when the cutting plane passes longitudinally through them.





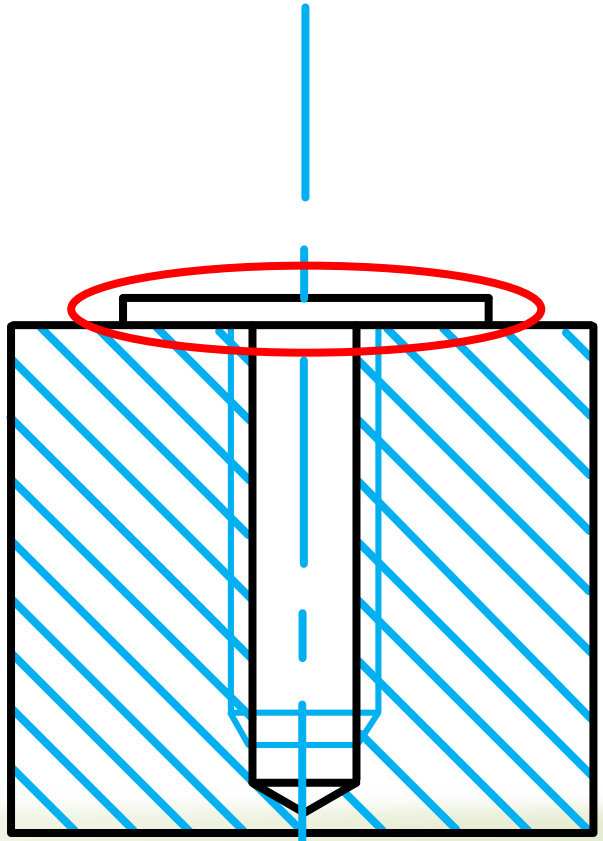
Mechanical Drawings (sectioning)

- **Pins** may **not** be sectioned when the cutting plane passes longitudinally through them.



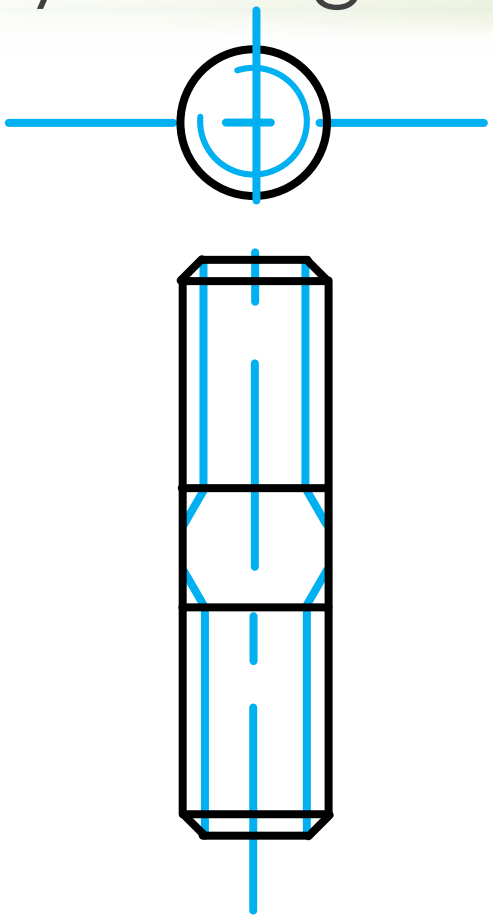
Mechanical Drawings (sectioning)

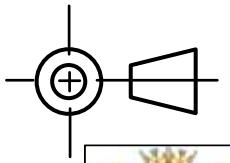
- **Washers** may **not** be sectioned.



Mechanical Drawings (sectioning)

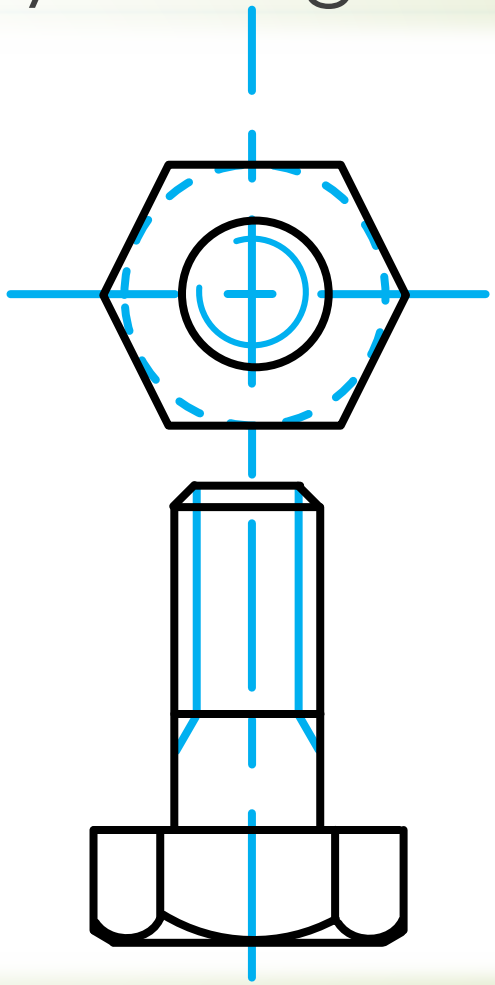
- **Studs** may **not** be sectioned when the cutting plane passes longitudinally through them.

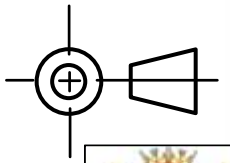




Mechanical Drawings (sectioning)

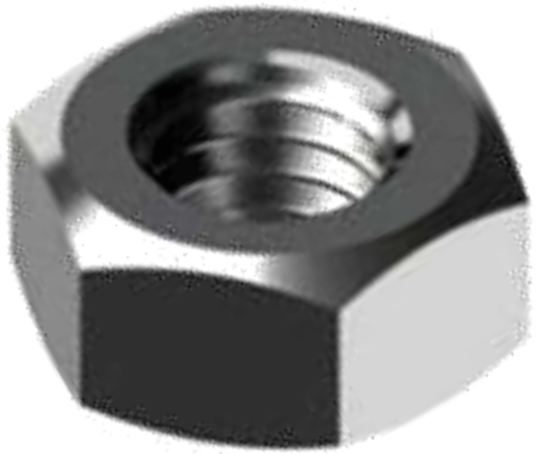
- **Bolts** may **not** be sectioned when the cutting plane passes longitudinally through them.

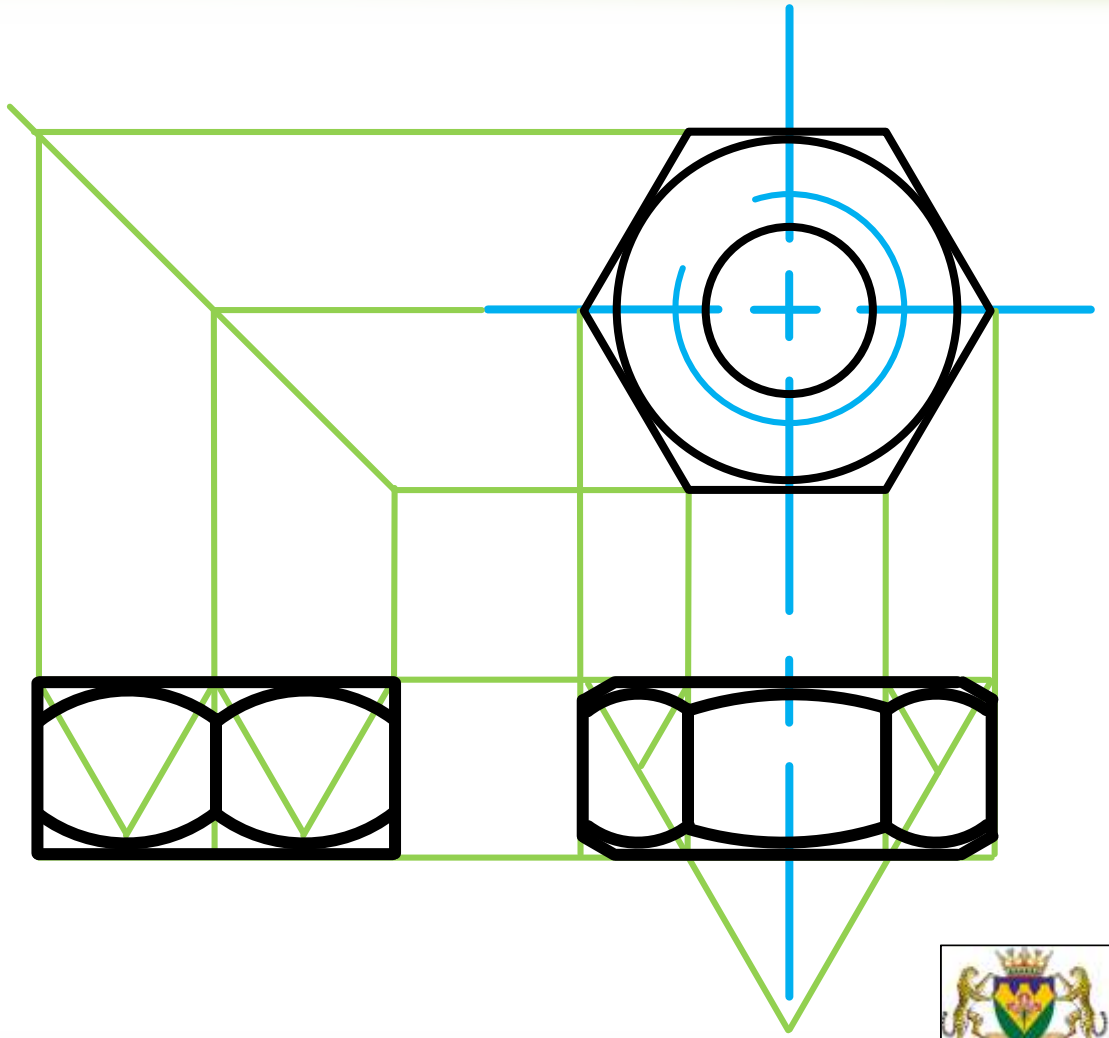




PRESENTATION OF COMMON FEATURES

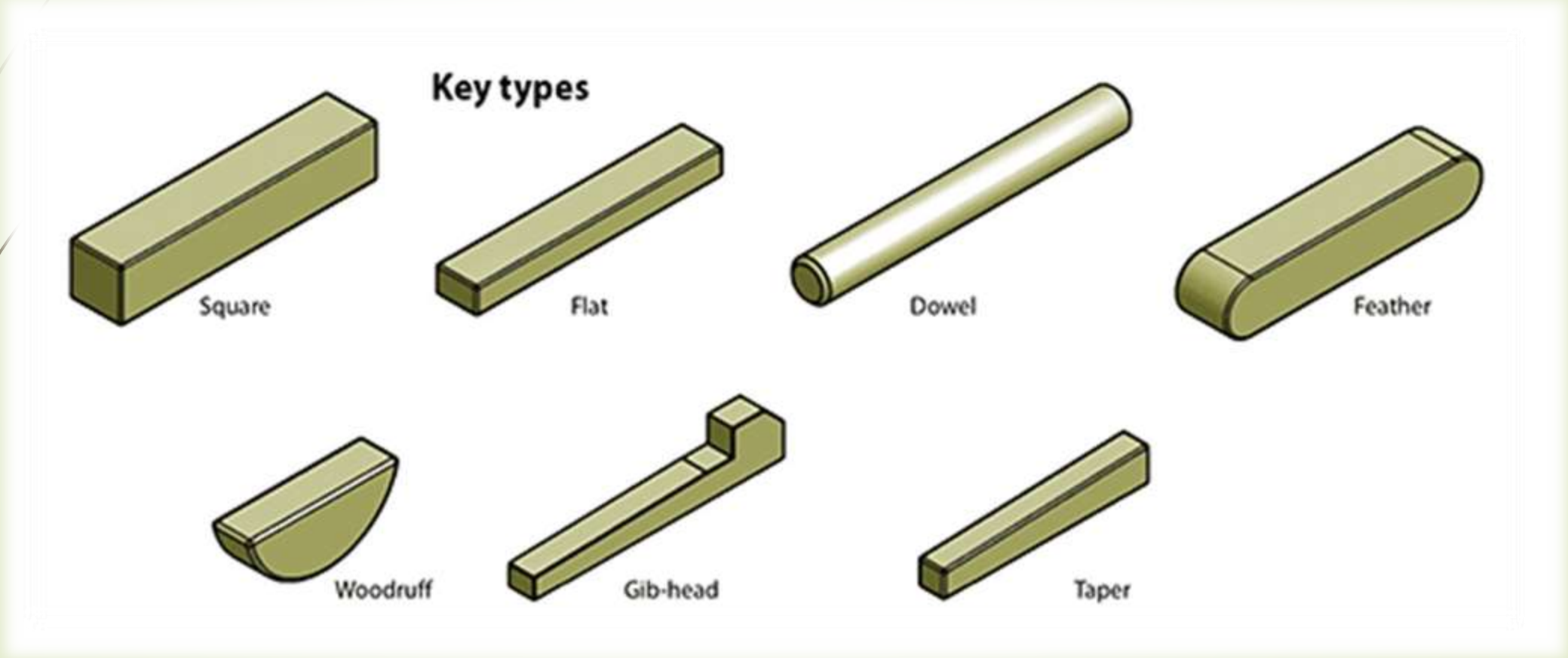
- **Nuts** may **not** be sectioned.





Mechanical Drawings (sectioning)

- **Keys** may **not** be sectioned when the cutting plane passes longitudinally through them.



Mechanical Drawings (sectioning)

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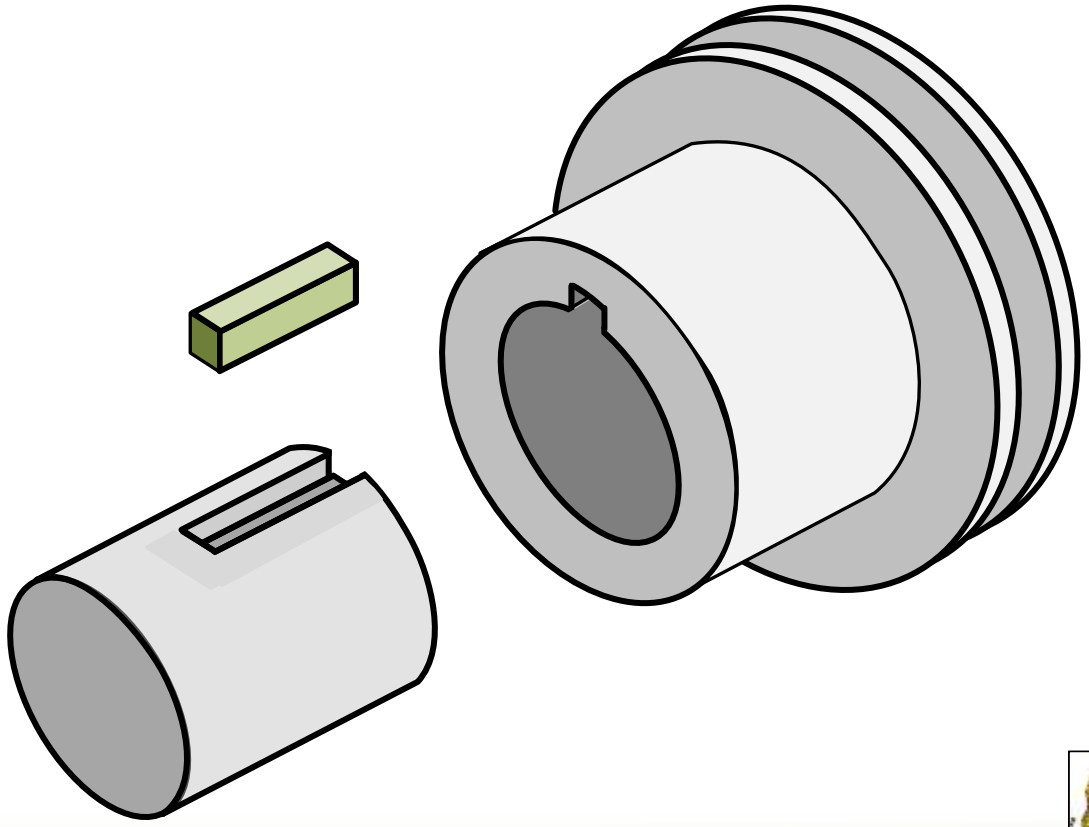

Mechanical Drawings (sectioning)

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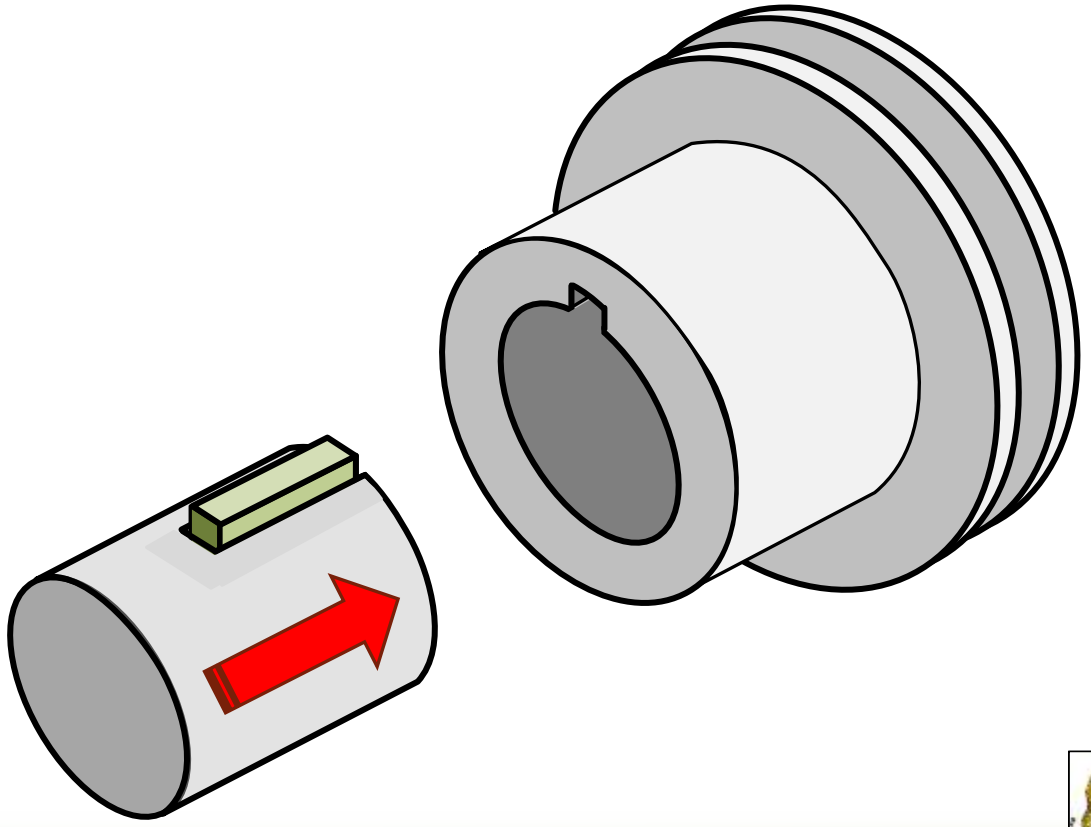

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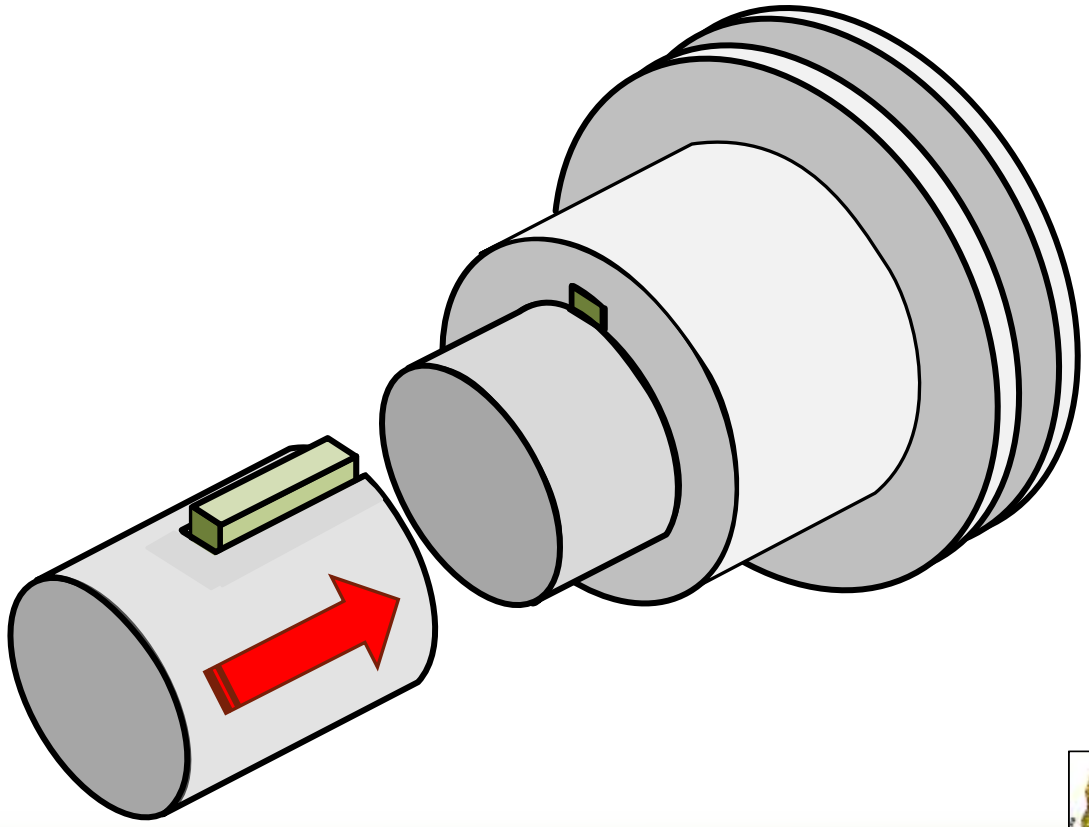

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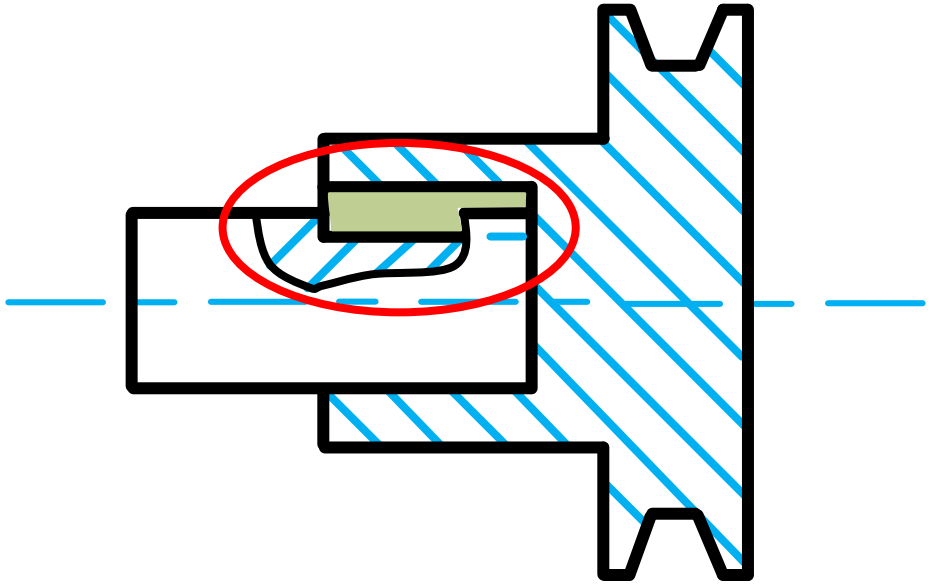

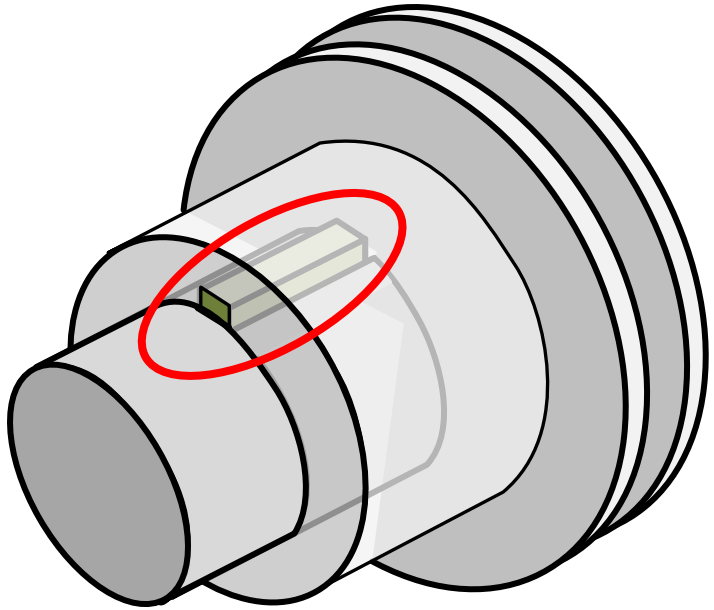

Mechanical Drawings (sectioning)

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