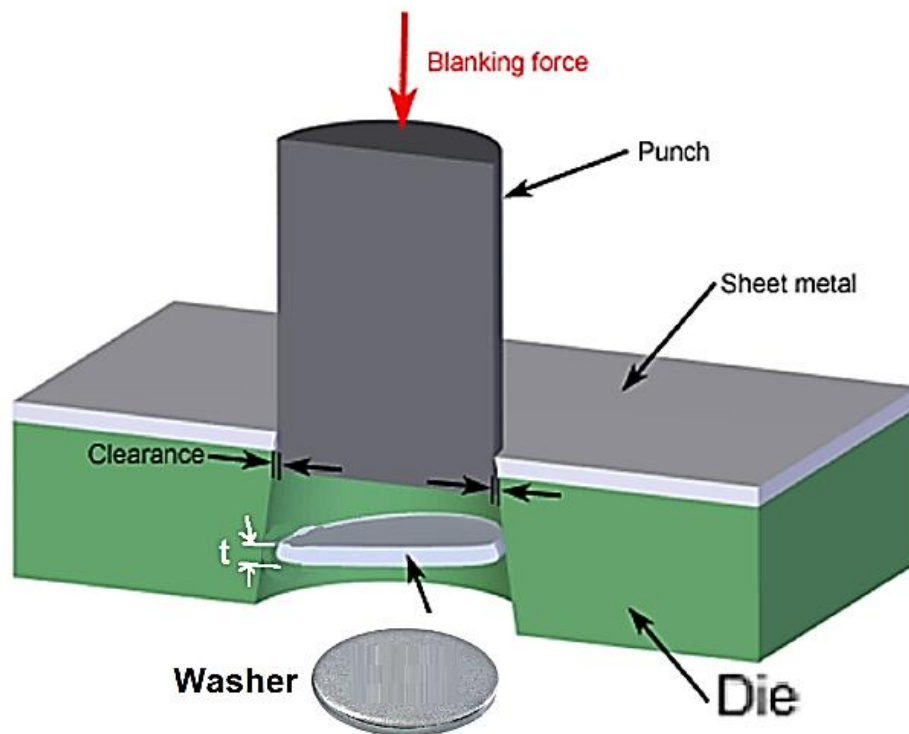


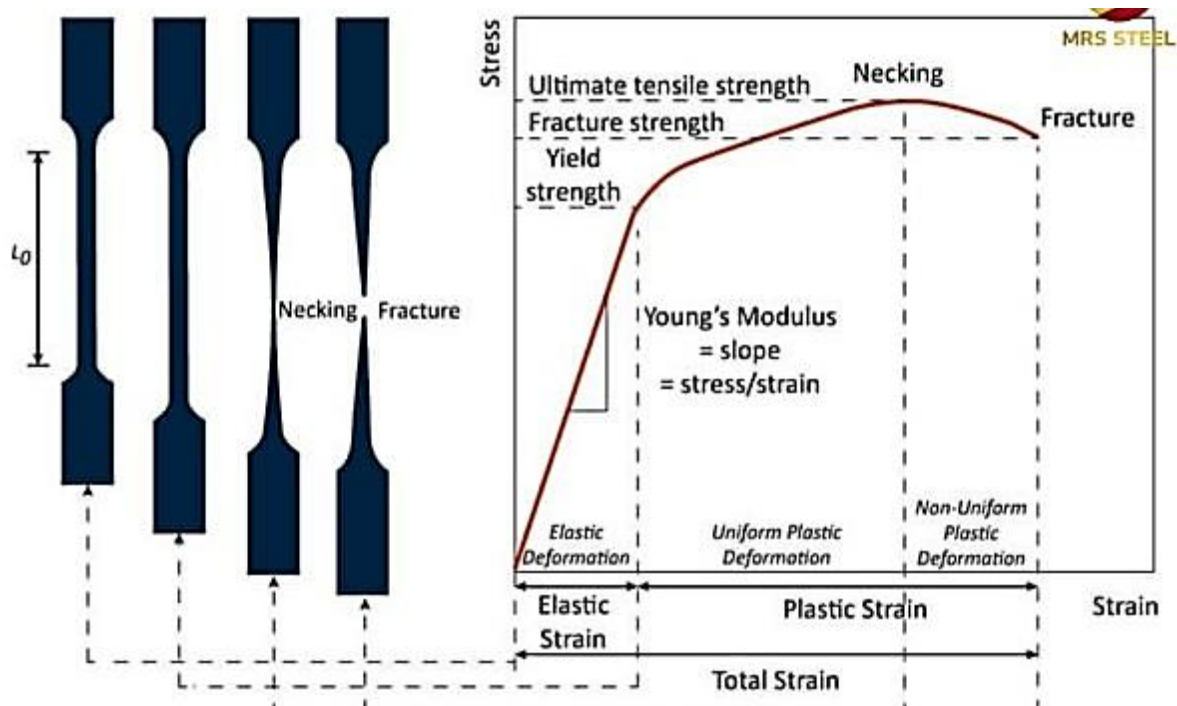
Plate forming, BLANKING



FORCE= STRESS X AREA

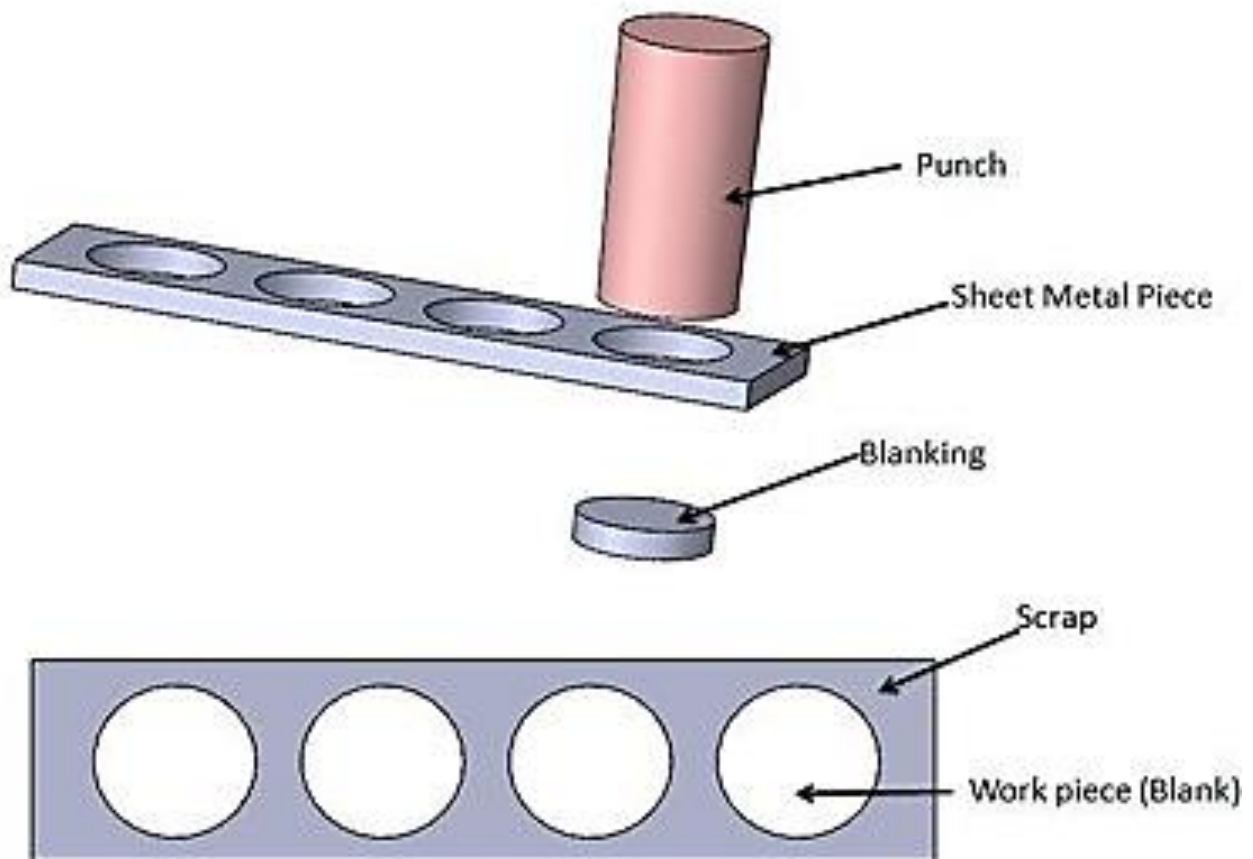
SHEARING FORCE = SHEARING STRESS X Area of shearing .

Max. Force= (0.7) (Ultimate strength) (Area of shearing)





$$D_{\text{punch}} = D$$

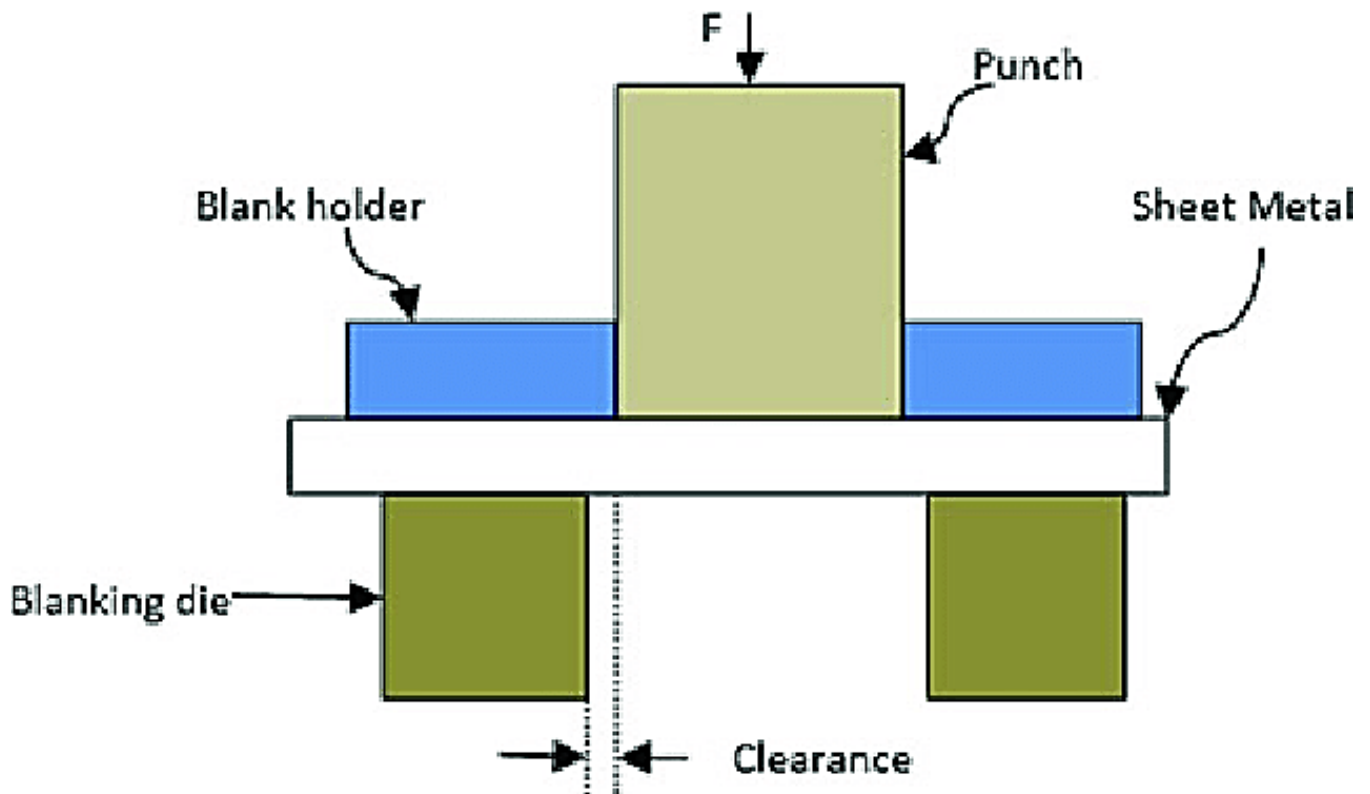


$$D_{die} = D_{punch} + 2 C$$

$$C = (\text{Mat. constant}) \times (t)$$

إذا لم يحدد

Take Mat. Constant = 0.1



Example 1:

Fig. shows 3mm plate sheared by Punch and Die of **BLANKING** operation.

Do:

Draw the section of Punch and Die.

Take clearance= 7% of thickness. (Mat. Constant = 0.07)

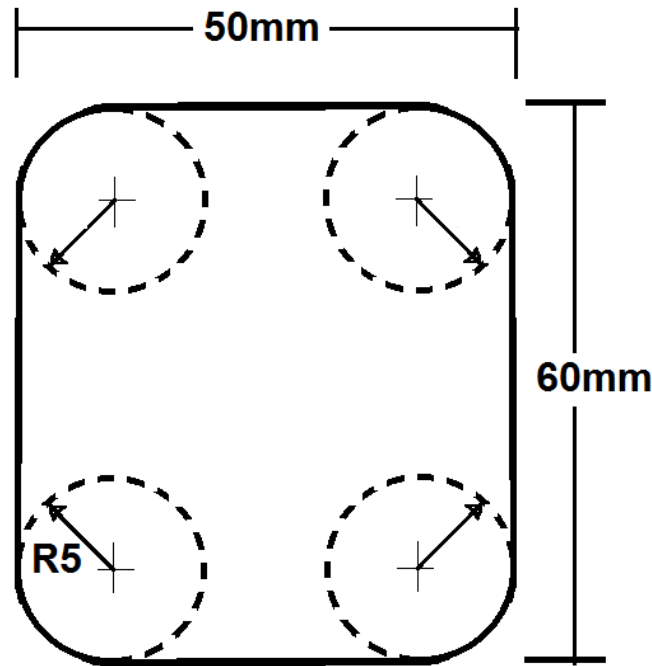


Fig. ()

Product

Solution:

(1) Draw the Punch and Die. Take clearance= 7% of thickness.

Clearance (c)= 7% of thickness

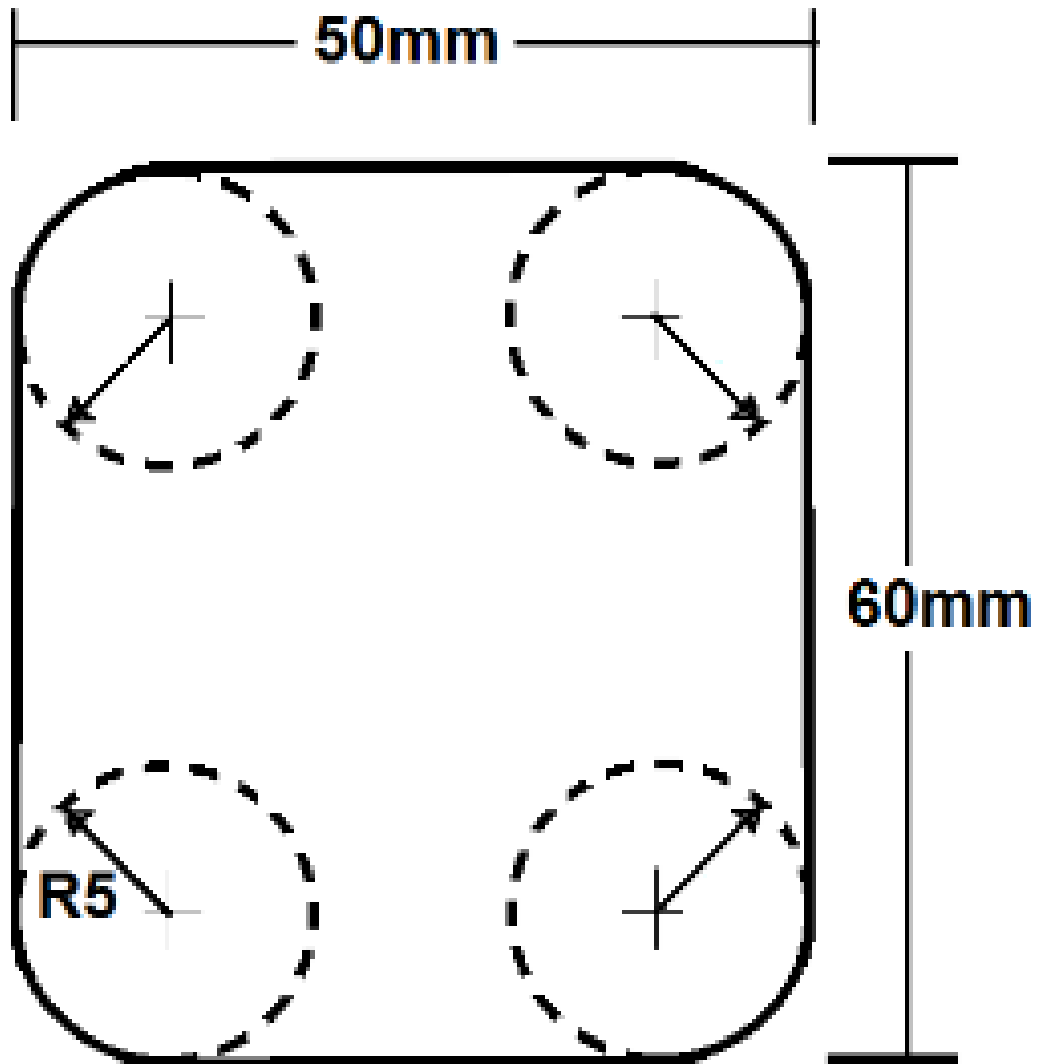
$$= 0.07 \times 3 \text{ mm}$$

$$= 0.21 \text{ mm}$$

Dimensions:

Punch 50, 60, R5

$$D_{\text{punch}} = D$$



punch

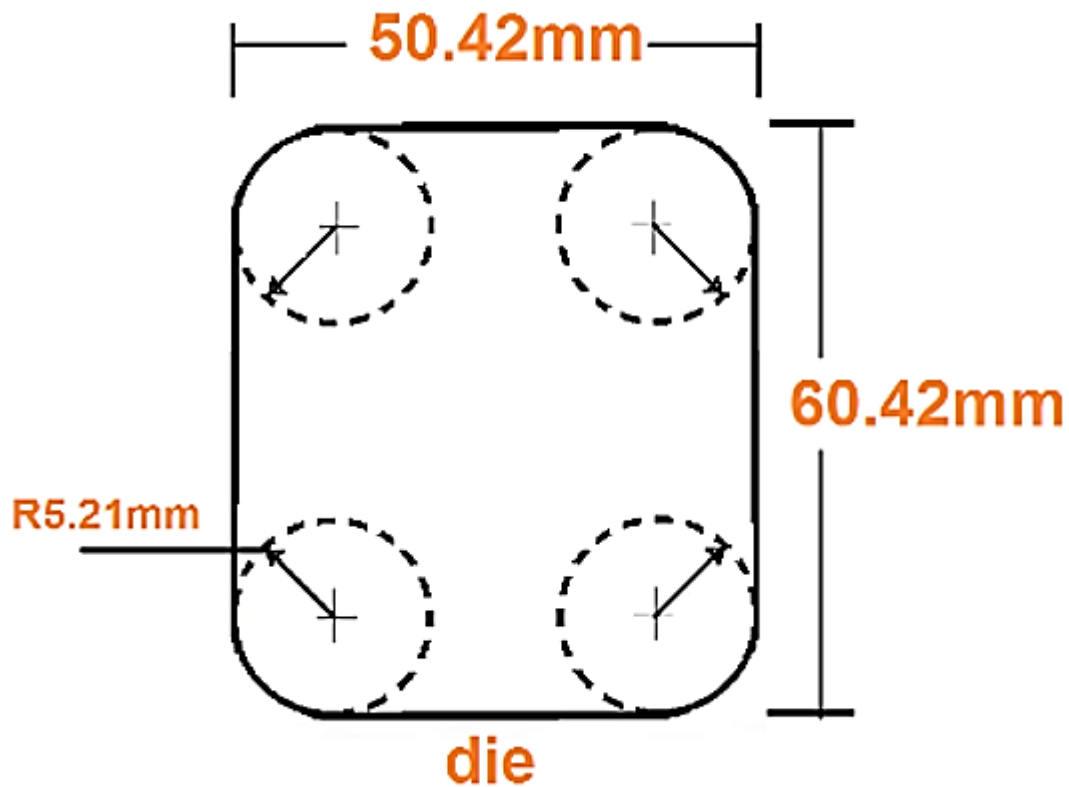
Die

$$D_{die} = D_{punch} + 2 C$$

$$\begin{aligned} D_{50} &= D_{punch} + 2 C \\ &= 50\text{mm} + 2 (0.21)\text{mm} \\ &= 50.42\text{mm} \end{aligned}$$

$$D_{60} = 60.42\text{mm}$$

$$R_5 = 5.42\text{mm}$$



Example 2

Fig. shows 3mm plate sheared by Punch and Die of BLANKING operation. Do: Calculate the Maximum force required to blanking operation. Take: Ultimate strength 240 N/mm².

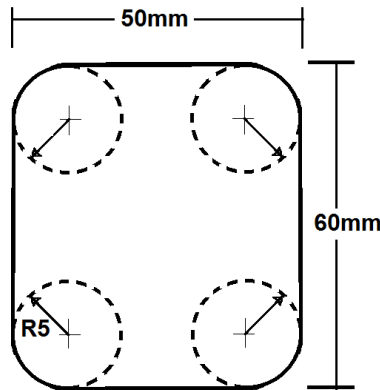


Fig. ()

Product

Solution:

FORCE= STRESS X AREA

SHEARING FORCE = SHEARING STRESS X Area of shearing .

Max. Force= (0.7) (Ultimate strength) (Area of shearing)
 = (0.7) (240 N/mm²) (Area of shearing)

$$\text{Area of shearing} = L \times t$$

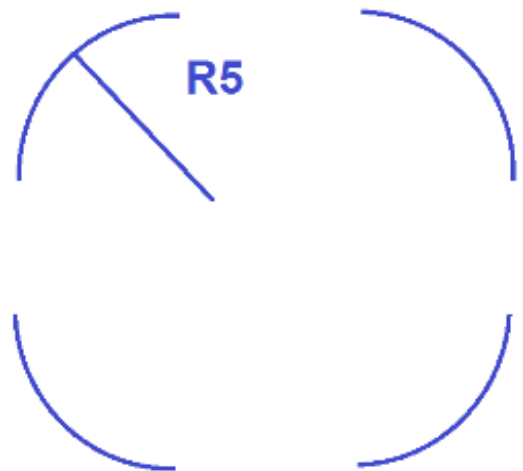
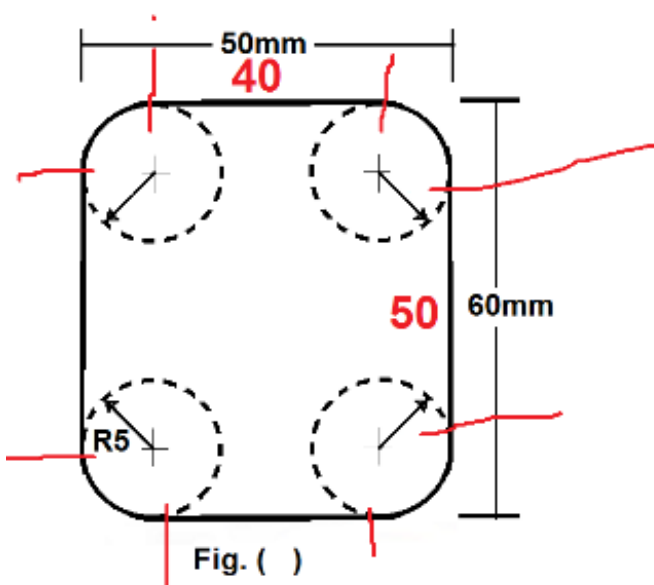


FIG. 1

$$L = 40 \text{ mm} + 40 \text{ mm} + 50 \text{ mm} + 50 \text{ mm} + 4 \times (3.14 \times 10 \text{ mm}) / 4$$

$$= 180 \text{ mm} + 31.4 \text{ mm}$$

$$= 211.4 \text{ mm}$$

$$(\text{Area of shearing}) = 211.4 \text{ mm} \times 3 \text{ mm}$$

$$= 634.2 \text{ mm}^2$$

$$\text{Max. Force} = (0.7) (\text{Ultimate strength}) (\text{Area of shearing})$$

$$= (0.7) (240 \text{ N/mm}^2) (634.2 \text{ mm}^2)$$

$$= 106.5 \times 10^3 \text{ N}$$

$$= 106.5 \text{ KN}$$

واجب

Problem 1: Fig. 1 shows 2mm plate sheared by Punch and Die of BLANKING operation. Do:

- 1- Calculate the Maximum force required to blanking operation. Take: Ultimate strength 240 N/mm²
- 2- Draw the Punch and Die. Take clearance = 7% of thickness.

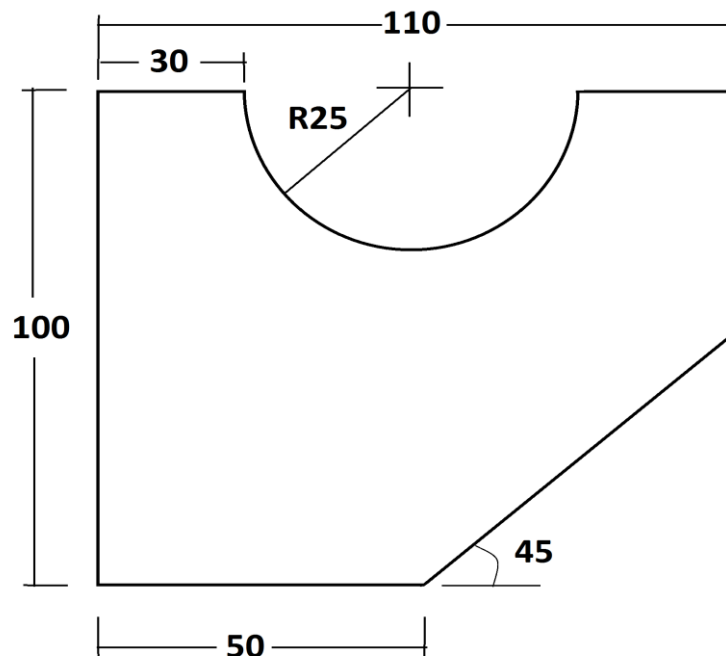


FIG. 1

Problem 2

Fig.2 shows 2mm plate sheared by Punch and Die of BLANKING operation.

Do: 1- Calculate the Maximum force required to blanking operation. Take: Ultimate strength 240 N/mm² 2- Draw the Punch and Die. Take clearance= 7% of thickness.

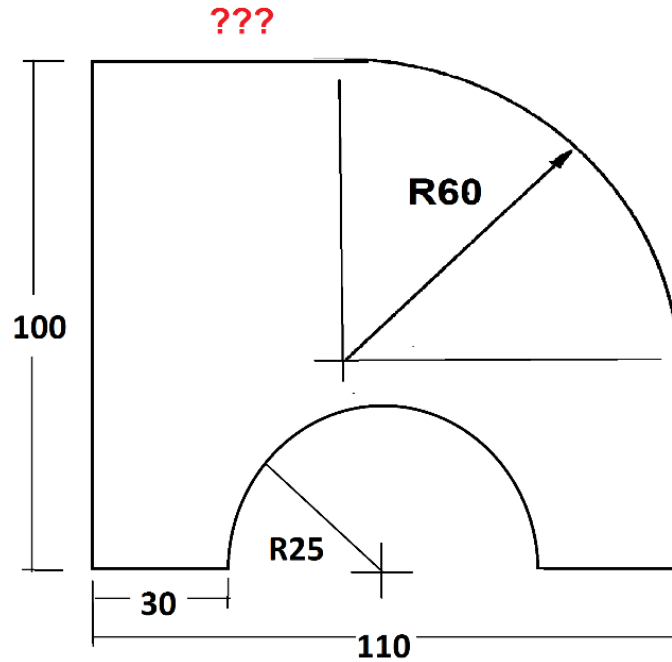


FIG. 2

Problem 3

Fig. 2 shows 3mm plate sheared by Punch and Die of BLANKING operation.

Do: 1- Calculate the Maximum force required to blanking operation. Take: Ultimate strength 240 N/mm² 2- Draw the Punch and Die. Take clearance= 7% of thickness.

Problem 4

Fig. 2 shows 4mm plate sheared by Punch and Die of BLANKING operation.

Do: 1- Calculate the Maximum force required to blanking operation. Take: Ultimate strength 240 N/mm² 2- Draw the Punch and Die. Take clearance= 7% of thickness.

Problem 5

Fig. 2 shows 5mm plate sheared by Punch and Die of BLANKING operation.
Do:

- 1- Calculate the Maximum force required to blanking operation. Take:
Ultimate strength 240 N/mm²
- 2- Draw the Punch and Die. Take clearance= 7% of thickness.
- 3- Make table of results
- 4 Draw chart to clarify the relation between thickness and the Maximum force required to blanking operation.

[1] Clarification: The factor 0.7 is commonly used as an empirical constant to relate the ultimate tensile strength of the material to its ultimate shearing strength (Shear Strength $\approx 0.7 \times$ Tensile Strength).

[2] Clarification: The clearance (C) is multiplied by 2 for the die diameter because the clearance must be added to both sides (left and right, or top and bottom) of the punch dimensions to create the total opening.

[3] Clarification: The corner radius (R5) only gets the clearance added once (C, not 2C) resulting in 5.21mm. This is because a radius represents a single radial distance from a center point, unlike a full diameter which spans across two sides.