

أجب على جميع الأسئلة الآتية - الأجوبة فى نفس ورقة الأسئلة.

Question No. (1)

(10 Points)

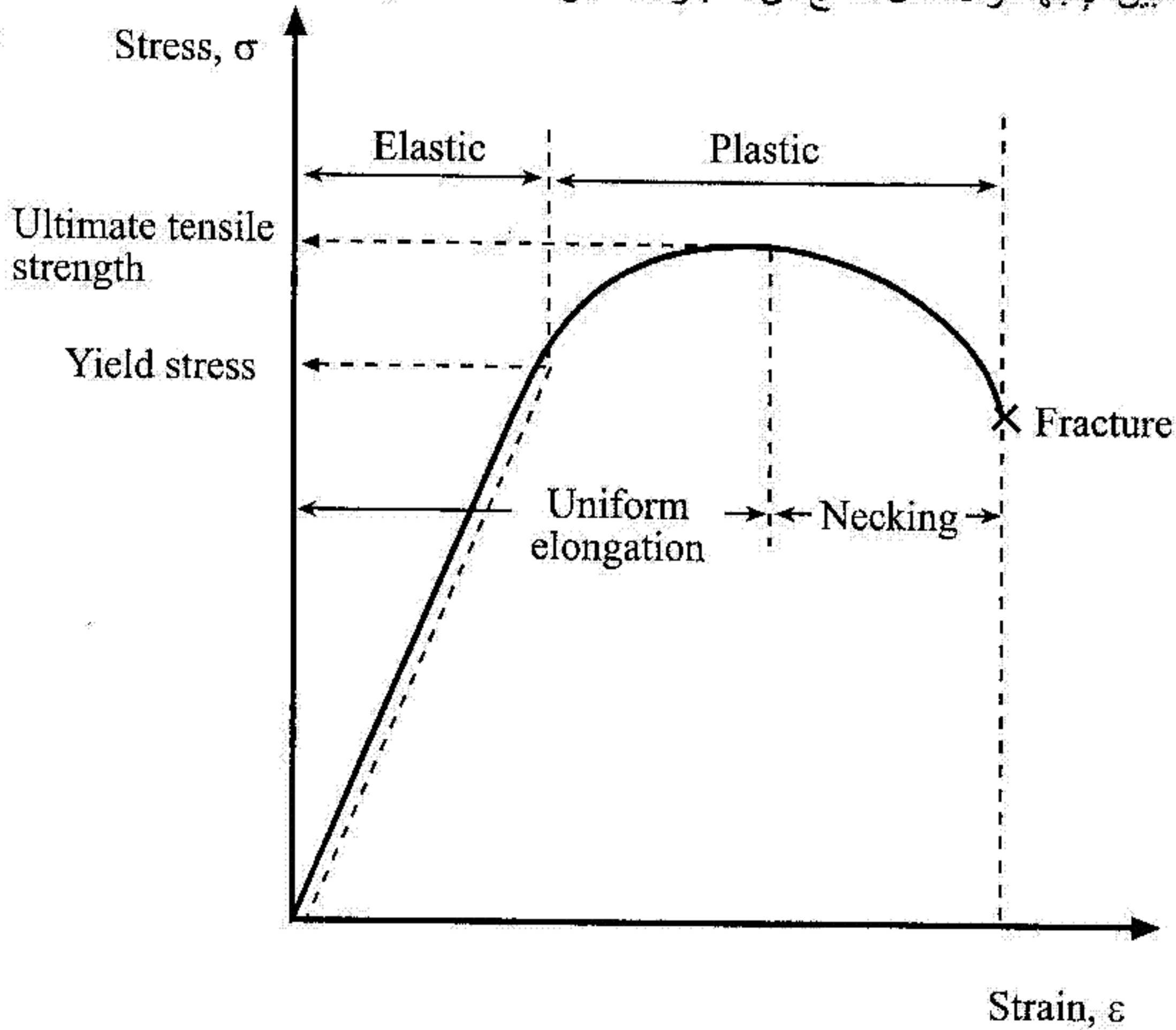
Put (\checkmark) in front of right statements or (X) in front of incorrect ones.

ضع علامة (\checkmark) أمام العبارة الصحيحة وعلامة (X) أمام العبارة الخاطئة.

1-	X
2-	\checkmark
3-	X
4-	X
5-	X
6-	X
7-	X
8-	X
9-	\checkmark
10-	X
11-	\checkmark
12-	X
13-	X
14	\checkmark
15	X
16	\checkmark
17	\checkmark
18	\checkmark
19	X
20	X

(a) Show with the net sketch a typical stress-strain diagram obtained from tension test, showing various features. (2 Points)

وضح بالرسم العلاقة بين الإجهاد والأنفعال الناتج من اختبار الشد موضحا المناطق المختلفة



(B) Write down the main components for each of the following Alloys

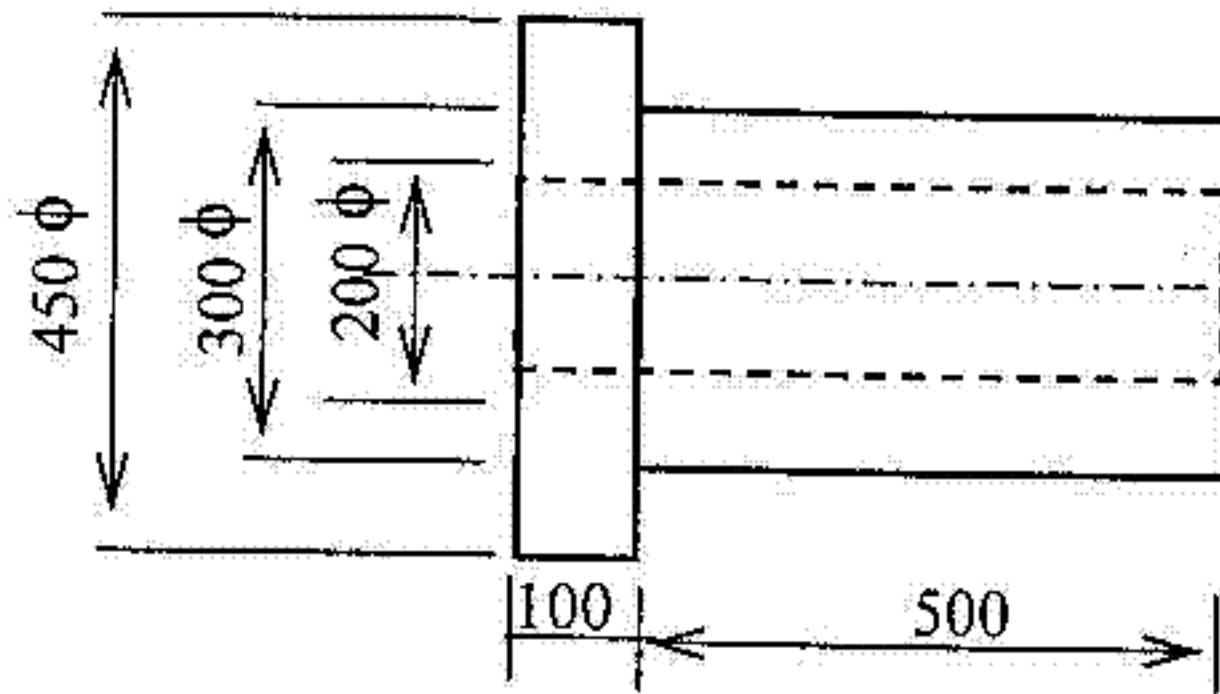
: (3 Points)

اكتب المكونات الأساسية للسبائك التالية

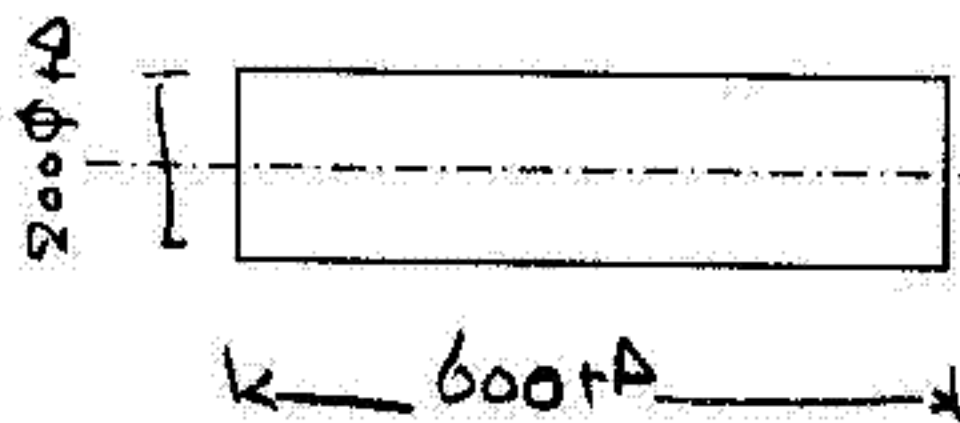
Alloy	Elements
Monel	. . .Nickel–copper alloy.
Inconel	. . . Nickel–Chromium–Iron alloy.
Brass	. . . Copper and Zinc
Bronze	. . . Copper and Tin.
Hastelloy	. . . Nickel–Molybdenum–Chromium–Iron alloy
Nichrome	. . . Nickel–Chromium alloy

(c) Show with the net sketch and complete dimensions the required pattern and core to manufacture the shown figure using sand casting. (4 points)

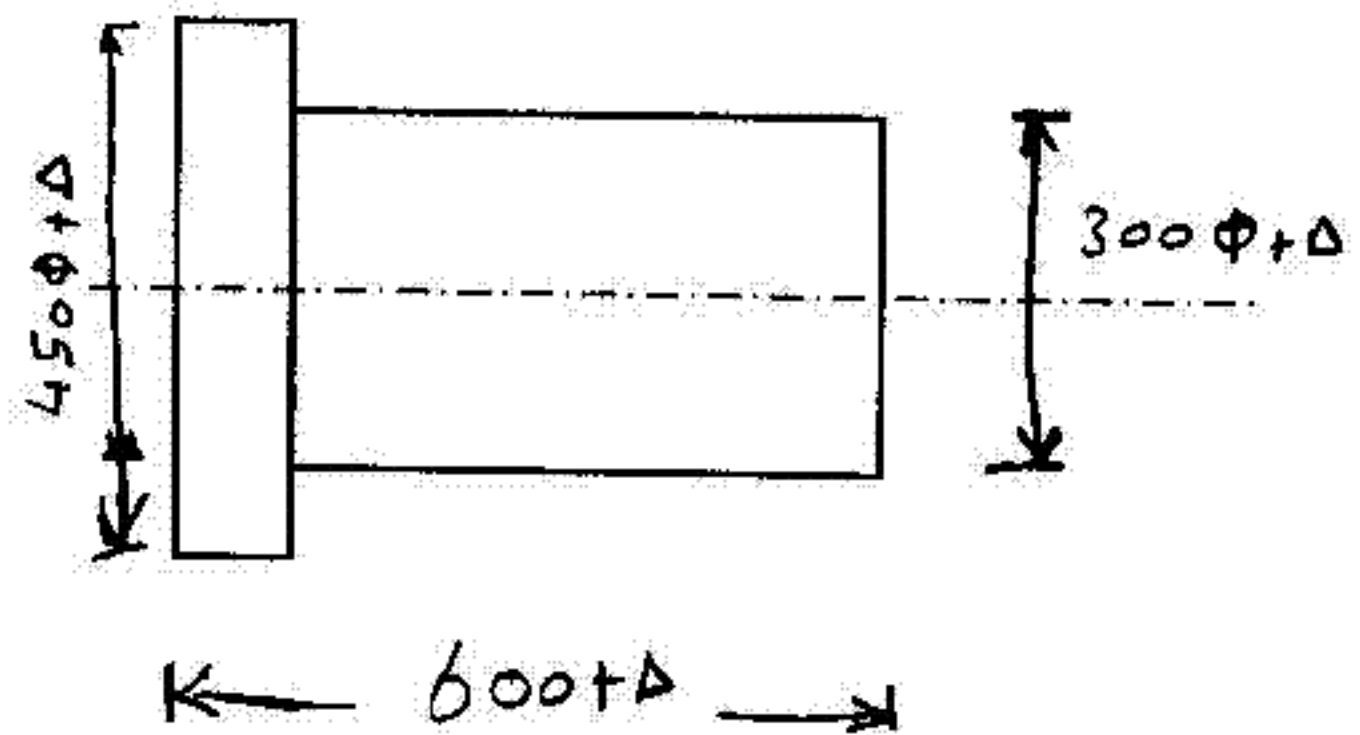
وضح بالرسم الدقيق والواضح مع كتابة الأبعاد شكل النموذج الخشبي والدليك لتصنيع الشكل الموضح باستخدام سبائك الرمل.



(All dimensions are in mm)



Core



Pattern

(d) For a tensile stress conducted on aluminum alloy, it was found that when a stress of 35 ksi is applied, a strain of 0.35% is produced within elastic range. Calculate modulus of elasticity of aluminum alloy. Use the same modulus to determine the length of a 50-in bar to which a stress of 30 ksi is applied. (3 points)

$$\text{Modulus of Elasticity, } E = \frac{\text{stress } (\sigma)}{\text{strain } (\epsilon)} = \frac{35 \times 1000}{0.35/100} = 10 \times 10^6 \text{ psi,}$$

From Hooke's law:

$$\epsilon = \frac{\sigma}{E} = \frac{30 \times 10^3 \text{ (psi)}}{10 \times 10^6 \text{ (psi)}} = 3 \times 10^{-3},$$

But, in the same time

$$\epsilon = \frac{L - L_0}{L_0}$$

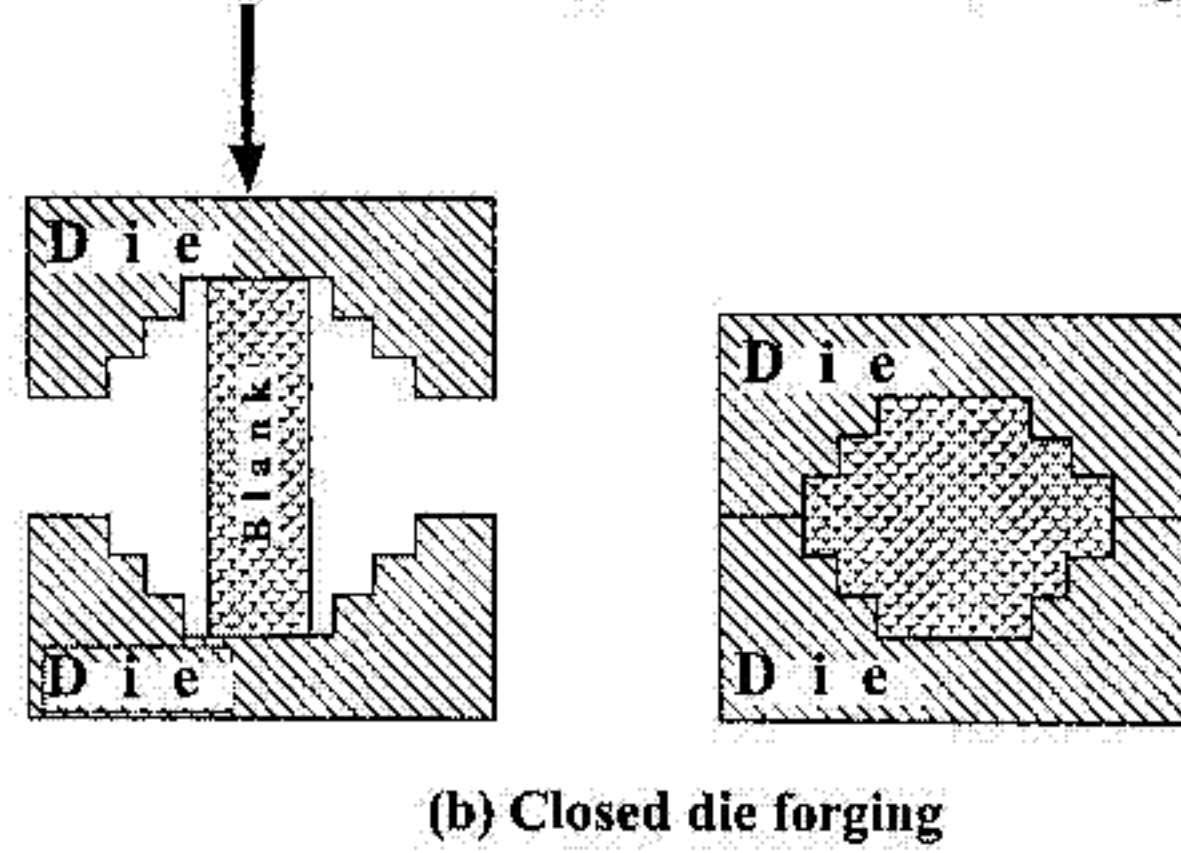
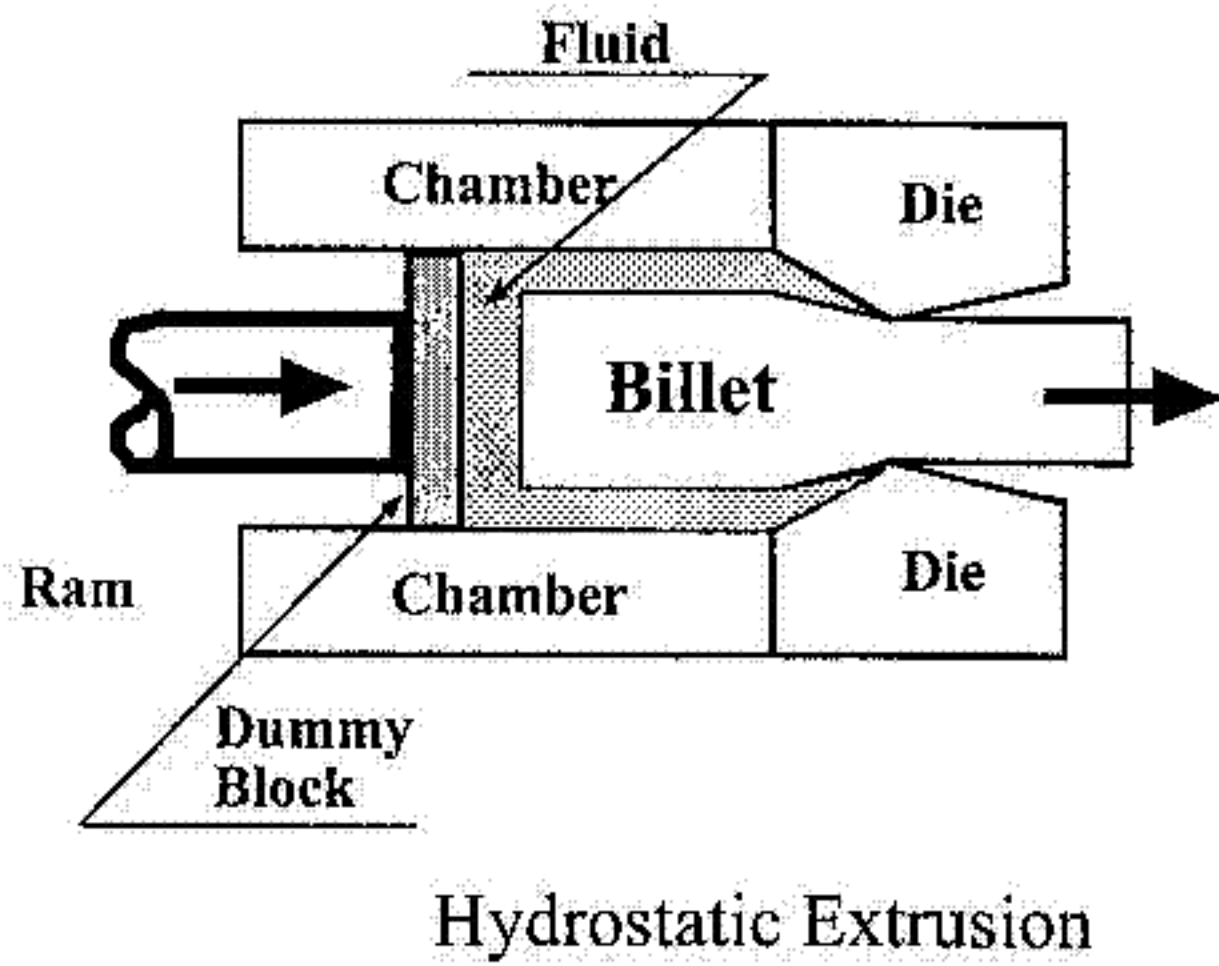
$$\therefore L = L_0 + \epsilon L_0, \therefore L = 50 \times (1 + 3 \times 10^{-3}), \therefore L = 50.15 \text{ in}$$

Question No. (3)

(8 Points)

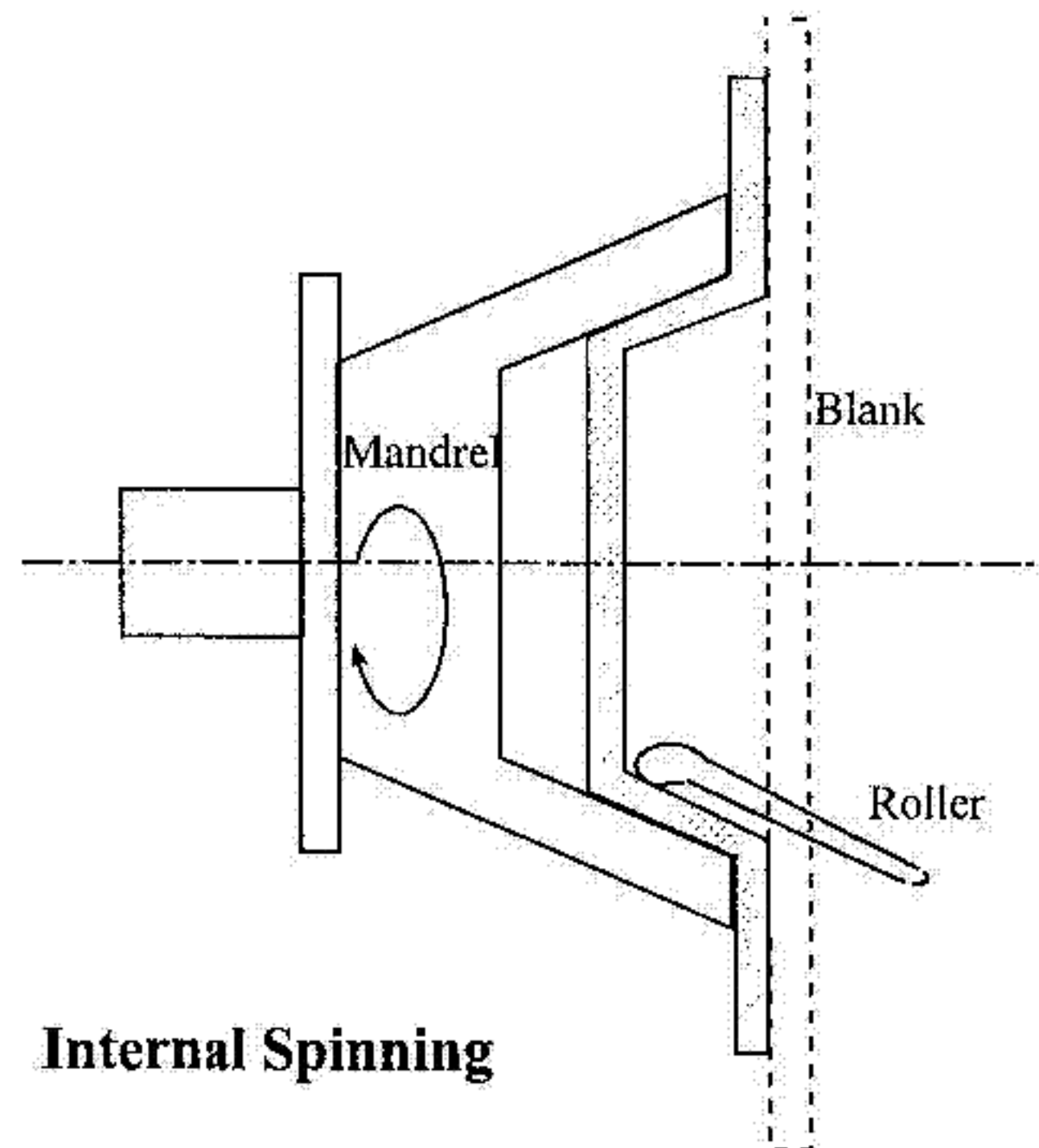
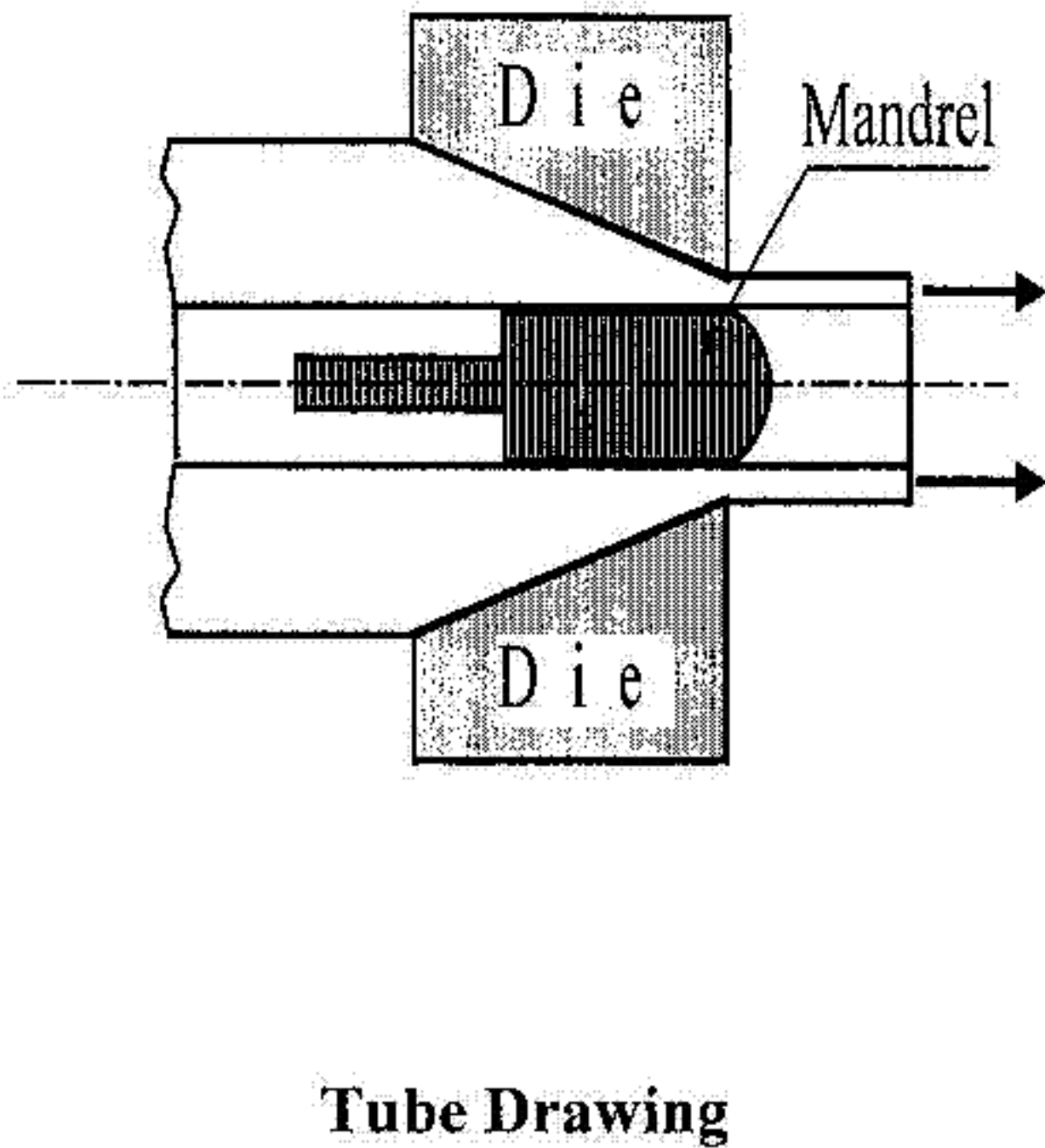
Show with the net sketch the difference between hydrostatic Extrusion and Closed Die forging. (4 Points)

وضح بالرسم الدقيق والواضح الفرق بين البثق الهيدروستاتيكي وحادادة الأسطوانات المغلقة



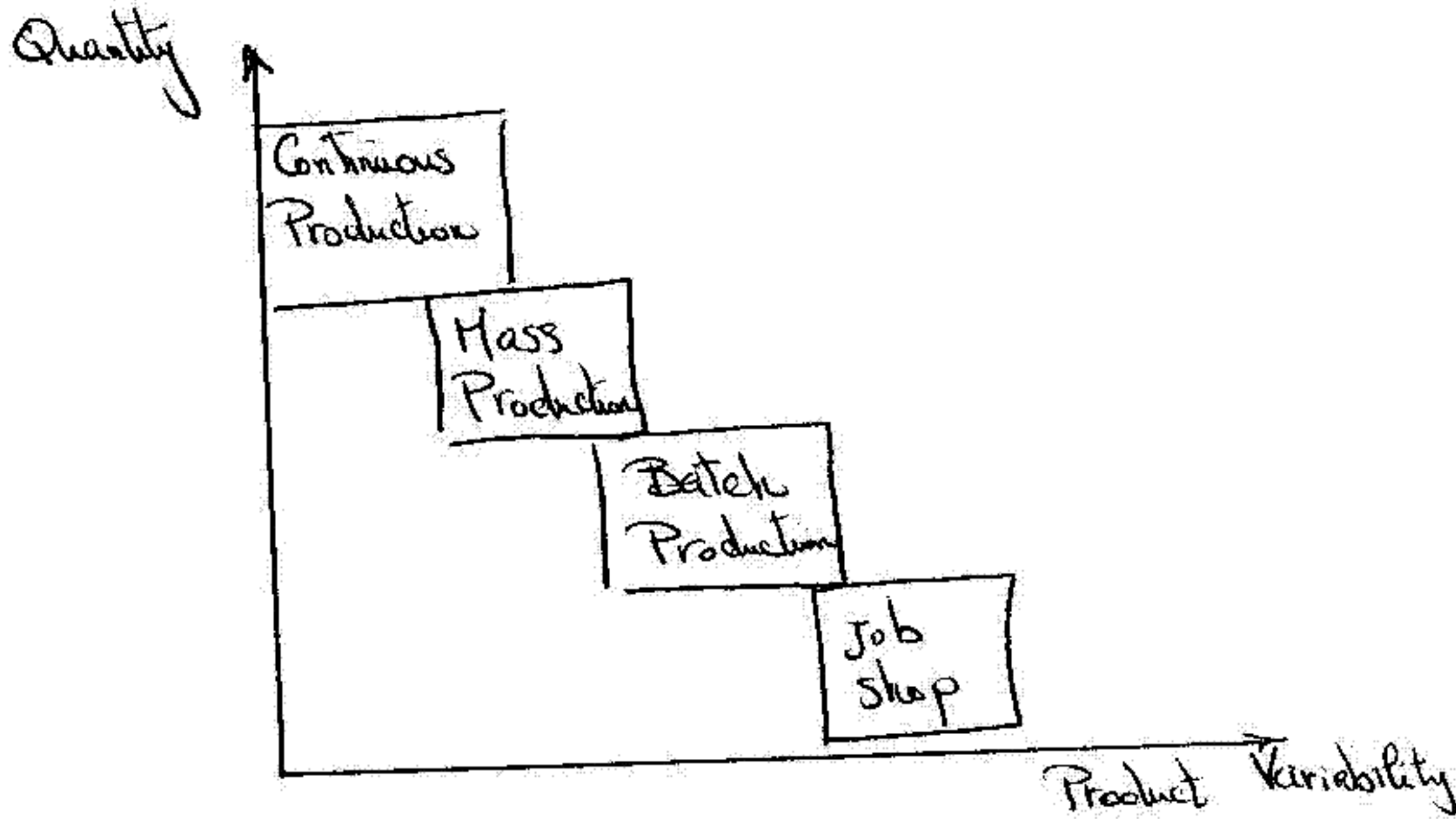
Show with the net sketch the difference between tube drawing and internal spinning. (4 Points)

وضح بالرسم الدقيق والواضح الفرق بين سحب الأنابيب والرحو الداخلي



Model Answer

- 4) Draw a schematic diagram of the different types of production.

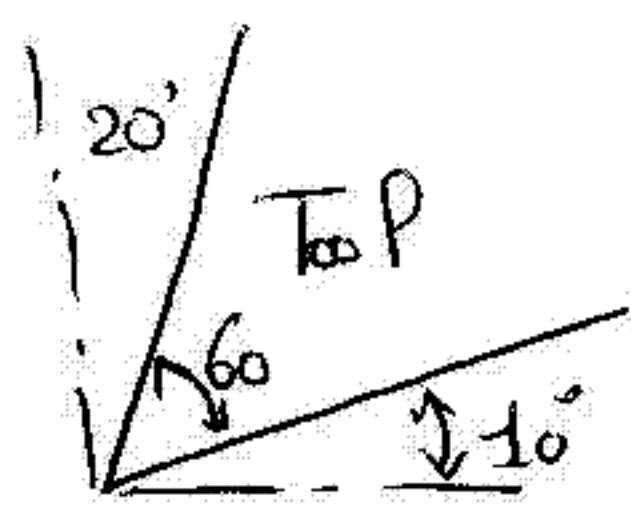


- 5) Calculate the Tolerances on both shaft and hole with maximum and minimum clearances if: hole is $30^{+0.10+0.35}$ Shaft is $30^{-0.15+0.15}$

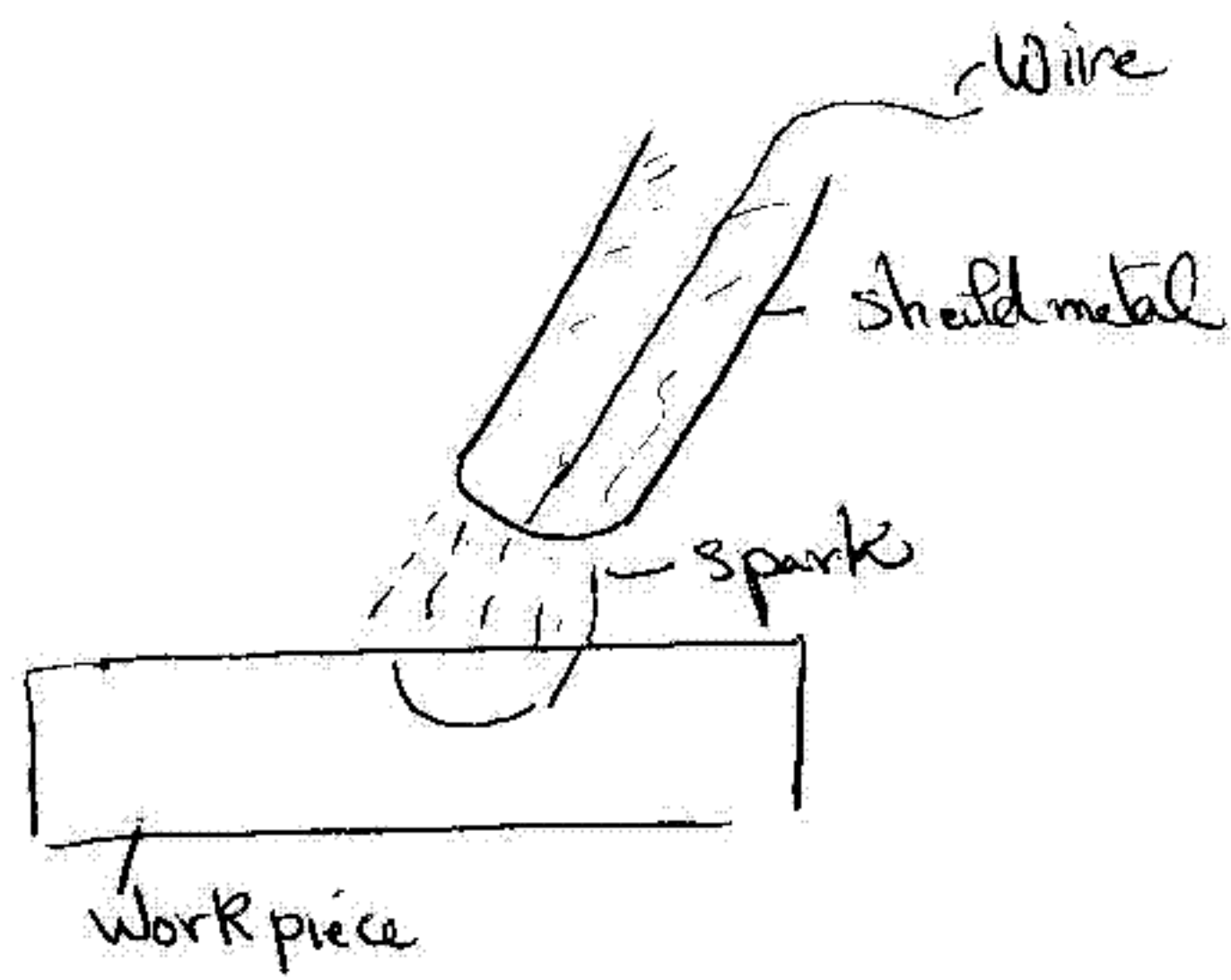
	Shaft	Hole
Maximum dimension	30.15	30.35
Minimum dimension	29.85	30.1
Tolerance	0.3	0.25
Minimum Clearance	-0.05	
Maximum Clearance	0.5	

6) Calculate the rake angle and determine its type if the cutting tool angle is 60° and the clearance angle is 10° . Draw a schematic.

rake angle = 20°
Positive +ve



7) Draw a schematic diagram of Shielded Metal Arc Welding SMAW.



8) MCQ (circle the right answer):

a) To protect the arc and weld from outside environment we should use:

- i) flux and gas ii) filler wire iii) pneumatic air

b) For a hole $50^{+0.15+0.25}$ and a shaft $50^{-0.15+0.05}$ the maximum clearance is:

- i) 0.2 ii) 0.3 iii) 0.4

c) in turning, the difference between initial and final diameter for a 4mm depth of cut is:

- i) 0.4 ii) 0.2 iii) 0.8

d) An example of a reciprocating motion can be shown in a machine like:

- i) Lathe ii) Drill iii) Shaper

e) Bolts and nuts are examples of:

- i) Thermal joint ii) mechanical joint iii) physical joint

f) In turning, when $N = 1000$ rpm and $f = 0.01$ mm/rev, the feed rate in mm/min is:

- i) 1 ii) 10 iii) 100

g) For enlarging a hole from D_0 to D , the depth of cut is:

- i) $D-D_0$ ii) $(D-D_0)/2$ iii) $(D+D_0)/2$

h) The main motion in planing operation is:

- i) Rotational ii) Linear iii) combined

i) For enlarging a hole from D_0 to D , the cutting speed is:

- i) $\pi DN/1000$ ii) $\pi D_0 N/1000$ iii) $\pi (D+D_0) N/1000$

j) The main motion in grinding operation is:

- i) Rotational ii) Linear iii) combined

9) A production plant manufactures 1,000,000 units per year. If the fixed cost of the plant is 20,000,000 LE/year and the unit selling price is 150 LE, find the variable cost when the cost is equal to the revenue?

$$150 \times 1,000,000 = 20,000,000 + V.C \times 1,000,000$$

$$V.C = 130 \text{ LE/part}$$