一、 如圖所示的拉刀，若每一齒升量為 0.05mm，若工件之待切削深度是 0.45mm，且必須額外多預留 6 齒之精加工齒，則（1）拉刀之總齒數 z=? (4%);（2）若工件長度是 500mm，則切屑截面積 Ac=?mm² (4%);（3）若切屑捲曲成圓形，則半徑 r=?mm (4%);（4）若容屑槽的半徑是切屑半徑 r 之兩倍，則容屑槽半徑 R=?mm (4%);（5）若容屑槽的開口長度是容屑槽半徑 R 之兩倍，則容屑槽開口長度 L=?mm (4%);（6）若拉刀的 pitch 是容屑槽開口長度 L 之 2.5 倍，則拉刀的 pitch P=?mm (4%);（7）拉刀的之切齒部(含 6 齒之精加工齒)的總長度=?mm (4%)。（答案對才給分）

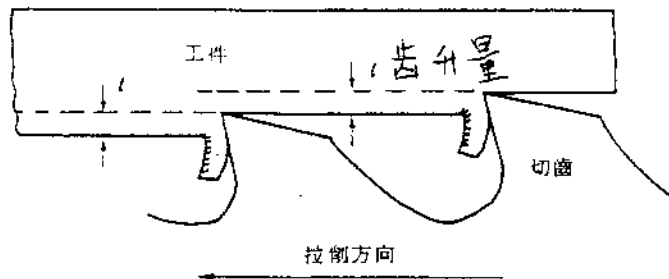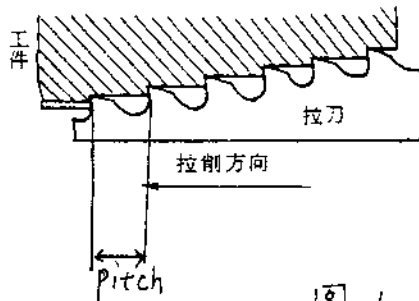

圖 8.11 拉刀之拉削作用

圖 1.

二、

A round casting 0.1m in diameter and 0.5 m in length. Another casting of the same metal is elliptical in cross-section, with a major-to minor axis ration of 2, and has the same length and cross-section area as the round casting. Both piece are cast under the same conditions. What is the difference in the solidification times of the two castings (solidification time =c(volume/surface area)²)(12%)

（背面仍有題目,請繼續作答）

三.

Shown in Fig. 2 is extrusion process in manufacturing process. (1) What is

spingback? (4%). (2) If springback factor $K_s = \dfrac{\alpha_f}{\alpha_i}$, prove $K_s = \dfrac{\dfrac{2R_i}{T}+1}{\dfrac{2R_f}{T}+1}$, where T is the

diameter of tube, R_i and R_f are the initial and final bend radii, respectively (4%).

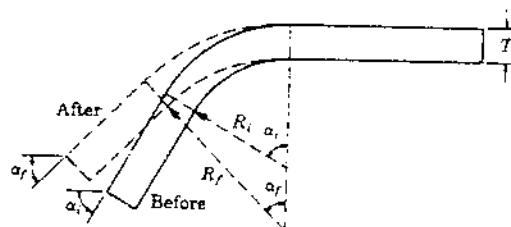(3) Explain the physical meanings of $K_s = 1$ and $K_s = 0$ (4%)

圖 2

四.

Here we will determine the ram force in direct extrusion (see Fig. 3)

(1) Define the extrusion ratio R (4%) . (2)Derive the true stain $\varepsilon_1 = ?$ (in terms of R)(4%)

(3) What is the energy dissipated in plastic deformation per unit volume u, if the material is perfect plastic material with a yield stress Y? (4%) (4)The work done on the billet W=? (4%) (5)The extrusion pressure p=?(4%)
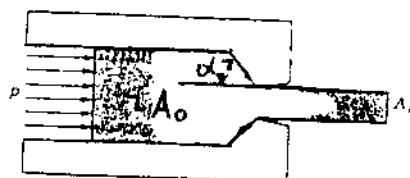

圖 3

五.

Shown in Fig. 4 is forces acting on a cutting tool in two-dimensional cutting. (1) Determine the total power input in cutting P=? (4%). (2) If the width of the cut be w, then the total energy per unit volume of material removed u_t=? (4%). (3) The power required to overcome friction at the tool-chip is the production of F and V_c. Derive the specific energy u_f required to overcome the friction (in terms of F_c and F_t) (4%).
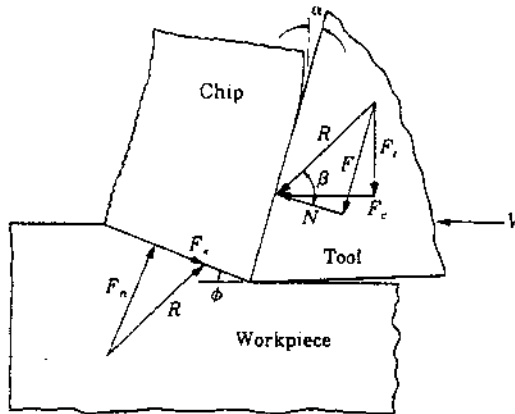

圖 4

六.

How can you tell whether a certain part is forged or cast? describe the features that you would investigate to arrive a conclusion? (10%)

七.

A 40-mm-high cylinderical specimen is being compressed between flat plates at a speed of 100mm/s. Claculate the engineering stain and true strain rate to which the material is being subjected when its height is 10mm. (6%)