一、 A surface 8 in. wide by 20 in. long is rough milled with a depth of cut 0.25 in. A 16 tooth cemented carbide cutter face mill 6 in. in diameter is used. The material is cast iron. 10%

(a) What is the cutting length?

(b) Estimate the cutting time if V = 120ft/min and tooth chip load = 0.0012 inches per tooth revolution.

(c) Find the cutter revolutions per minute.

二、 (a) Explain why a casting may have a lightly different shape than the pattern used to make the mold.

(b) Describe the advantages and limitations of hot-chamber ad cold-chamber die casting processes, respectively. 10%

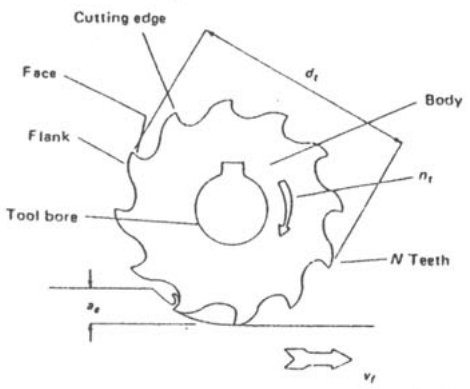
三、 (1) 切削加工時生之切屑有幾種？如何產生？

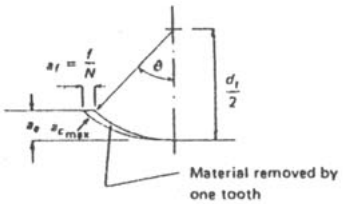
(2) Built-up 如何產生？有何影響？ 10%

四、 (1) 如圖所示乃是 slab-milling 銑削示意圖，試導出最大之切屑厚度

$$a_{c_{max}} = \frac{2v_f}{Nn_t}\sqrt{\frac{a_e}{d_t}\left(1+\frac{a_e}{d_t}\right)}$$

(2) slab-milling 時，銑刀之 rpm 一定，齒數對所銑削之平面有何影響？銑削能得真正平面嗎？（必須從（1）小題討論得答案） 20%





(背面仍有題目,請繼續作答)

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5 Explain or describe the following terms: plasticity, structure-sensitive properties, tribology, surface integrity, and spring-back. (10%)

6 For the following material properties: yield strength, toughness, ductility, electrical conductivity, specific heat, thermal conductivity, and melting point, describe and explain which are important for each of the following manufacturing processes: casting, forging, extrusion, cutting, grinding, ultrasonic machining, EDM and laser-beam machining. (20%)

7 What are the main features characterizing the similarities and differences between the conventional and non-conventional machining processes? Illustrate your point with two processes from each group. (10%)

8 Illustrate and explain the principle of a hardness test. How does the hardness of a ductile material such as steel change during a cold working process and during a hot working process? (10%)