

8. 精密齒輪之製造技術對於汽車航太以及產業機械及工具機業之
(10%) 技術提昇有關鍵性之影響。齒輪在傳動時齒腹、齒根受作用力
之負荷很大，因此在加工齒輪之後仍要做熱處理，以提昇齒輪
之機械強度以及改進耐磨耗性、韌性、耐衝擊性，試說明齒輪
熱處理程序。

9. 汽車鈹金件佔台灣汽車零組件回銷日本及其它地區很高的比
(10%) 例；車輛外鈹金不但要求外觀更要求加工精度要好，目前國產
汽車鈹金之厚度大約在2-3 mm 左右。下圖顯示厚度較薄之鈹金
在沖壓成形過程中容易破裂。試說明沖壓模具在設計上對鈹金
成形品質之影響如何。

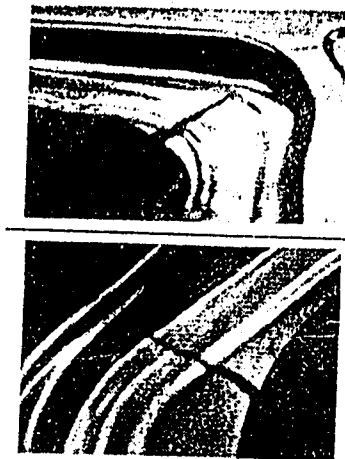


圖 汽車鈹金破斷實例

5. 對精密製造技術上而言，切削速度範圍之選擇對於加工成本有(10%)關鍵性之影響。(a) 試由下圖說明在引進工具機時在轉數(切削速度)方面之考慮條件。(b) 由圖中可看出刀具成本和切削速度成一定比例增加，試說明其原因。(c) 並且說明固定成本包括那些項目。(d) 試說明切削成本為何隨著切削速度之增加而降低。(註：所謂切削成本表示刀具進入工件，把工件切削成一定形狀在這一段過程中所造成之成本)

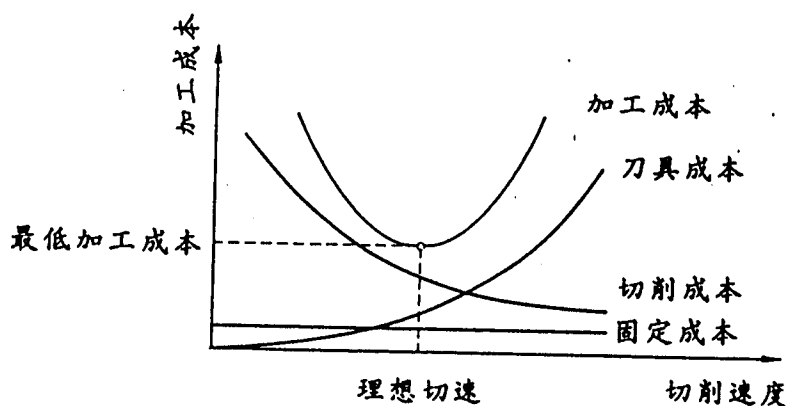
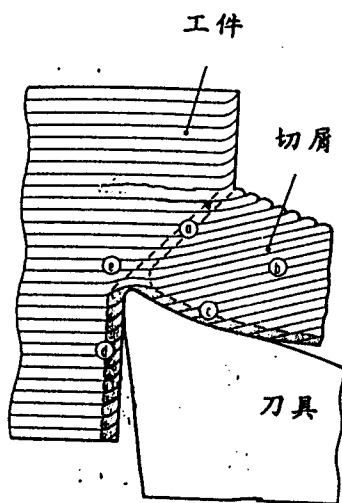


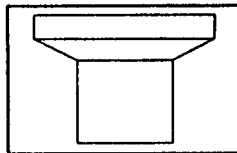
圖 加工成本和切削速度之關係

6. 試說明現代化之加工技術
(10%) (1) 雷射加工
(2) 水刀切削
之工作原理及使用之領域。

7. 試由下圖之5個區域(a, b, c, d, e)解釋車削中切屑之成形過程。(10%)程。



1. State five broad categories of processing methods for materials. List various techniques used in each category. Address the process characteristics, the equipment used, and the products manufactured by each technique. (20%)
2. Establishing design guidelines can help quantify design analysis for CAD/CAM applications and result in significant cost savings. Please identify significant design guidelines in casting processes pertaining to shrinkage, tolerances, draft, allowances, parting lines, flat areas, corners, angles, and section thickness, etc. (10%)
3. Select a manufacturing process and organize the production facilities to manufacture a cost-competitive, high-quality product, as shown in the following figure. Assume that the part is round, 5 in. long, and that the large and small diameters are 1.5 in. and 1 in., respectively. List different processes and select the best one for producing the part with a selected type of material, production rate, surface finish, dimensional accuracy and cost-competitiveness. (10%)



4. Find the maximum reduction per pass of a wire drawing process. Assume the wire (10%) is made of a perfectly plastic material.