

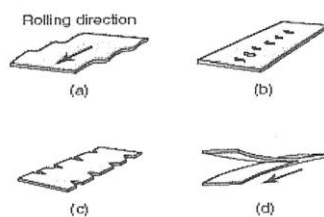
淡江大學 99 學年度碩士班招生考試試題

系別：機械與機電工程學系

科目：機 械 製 造

本試題共 1 頁，10 大題

1. In comparison to material removal processes, what are the advantages and disadvantages of casting process? What is the difference between the characteristic grain structure in a casting of pure metal and alloy? What is the main purpose of having a riser in the casting mold and what is the basic requirement of designing this riser in order to satisfy its function? (10%)
2. Briefly explain the possible reason(s) that causes the defects in flat rolling: (a) wavy edges; (b) zipper cracks in the center of the strip; (c) edge cracks; and (d) alligatoring (as shown schematically in the attached figure). (10%)



3. What are the major differences between fusion welding and solid state welding? Briefly explain how power density, heat transfer efficiency and melting efficiency affect the welding process and the resulted HAZ (10%)
4. What is nanoimprint? (Briefly explain the processes of press-type nanoimprint, step & repeat type nanoimprint, and roll-to-roll type nanoimprint.) What are the major problems/difficulties involved in the nanoimprint processes? (10%)
5. What is the underlying principle of AJM, WEDM, RUM(rotary ultra-sonic machining) and ECG (electro-chemical grinding)? What factors are involved in the material removal rate and surface roughness in EDM, and why? (10%)
6. Briefly explain the advantages and shortages of up-milling and down-milling process. Which (up or down milling) is your choice if you are asked to perform the milling operation on a machine with huge backlash. What if the machine is alright and the workpiece is surface hardened? Why? (10%)
7. What functions do the "dressing" and "truing" serve to the grinding operation? What are the underlying principles and advantages of ELID grinding? What is grinding ratio? What factors could contribute to chatter in grinding? (10%)
8. What are the advantages and disadvantages of hot working vs. cold working? What are your main considerations in choosing hot working instead of cold working? What are the effects of friction and strain rate on the metal forming process? (10%)
9. Briefly explain the following terms/processes (1) Fick's law of diffusion (2) Arrhenius equation (3) TIG (4) Investment Casting (5) Roughness (Ra, Rq) (10%)
10. What are the differences between lapping, polishing and grinding? What are the differences between mechanical polishing and chemical-mechanical polishing (CMP)? Why it is necessary to have the traditional lapping-etching-polishing routine replaced by grinding-CMP process when processing 12" wafers? (10%)