

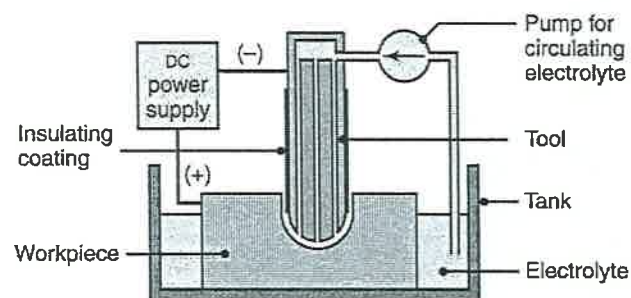
## 國立臺灣科技大學 109 學年度碩士班招生試題

系所組別：機械工程系碩士班乙組

科目：製造學

(總分為 100 分)

1. Please explain the following terms. (20%)
  - (a) Extreme ultraviolet (EUV) lithography technology (5%)
  - (b) Gating system (5%)
  - (c) Springback (5%)
  - (d) Amorphous alloy (5%)
  
2. (a) Please describe what resistance welding is (5%).  
 (b) List two manufacturing process derived from resistant welding with explanation of their principles (5%).
  
3. Please use the following figure to explain the materials removal mechanism of electrochemical machining. (10%)



4. A railway wheel can be manufactured by either low-pressure casting process or forging.
  - (a) Please describe the main consideration of material properties in these two methods (5%)
  - (b) Please describe the main difference of the wheels made by these two methods, and which one might be better for high-speed railway vehicle? (5%)
  
5. Please draw a figure and explain the process of polymer extrusion process from hopper, 3-section barrel, to die. (10%)



## 國立臺灣科技大學 109 學年度碩士班招生試題

系所組別：機械工程系碩士班乙組

科目：製造學

6. 關於金屬成形加工，
- (a) 請說明金屬成形加工的基本原理及分類。(5%)
- (b) 金屬成形加工分為熱作(hot working)與冷作(cold working)，以下哪幾項是熱作的特性? (5%)
- (1) 成品的 strength 及 hardness 較佳, (2) 成品的 accuracy 及 surface finish 較差, (3) isotropic mechanical properties, (4) less overall energy required, (5) higher deformation forces required (複選，需全對才得分)
7. 積層製造(AM)技術，依 ISO/ASTM 52900:2015(E)的標準，可分為七大類 (Material extrusion, Vat photopolymerization, Binder jetting, Material jetting, Powder bed fusion, Directed energy deposition, Sheet lamination)。請問哪幾類是以粉末為主要材料? (5%)
8. 關於量測，兩組同學測試加工設備的優劣，各加工 10 個工件，並對某一重要尺寸( $d=10\text{cm}$ ) 進行量測，得到的平均值與標準差如下表所示，請問哪一組的 accuracy 較佳? 哪一組的 precision 較佳? (5%，需全對才得分)
- | 組別 | 平均值     | 標準差     |
|----|---------|---------|
| A  | 10.1 cm | 0.05 cm |
| B  | 9.75 cm | 0.02 cm |
9. 半導體製程的目的，主要有(1) Layer addition, (2) Layer removal 及(3) Layer alteration 三類。請問 Electroforming, Ion implantation, PVD, Thermal oxidation, Etching 等五項製程，分別屬於哪一類? (10%)
10. 關於切削與研磨加工，
- (a) 請繪圖說明 up milling 與 down milling，並比較兩者的 cutter rotation direction, length of a chip, 及 tool life。(5%)
- (b) 常見的磨料有  $\text{Al}_2\text{O}_3$ 、SiC、cBN 及 Diamond。如果欲研磨以下三種物件，應選擇何種磨料?  
(1) Steel (2) hardened tool steel (3) ceramics。(5%)

