

1002 機械系博士班資格考試題目

考試科目	方式	
設計製造	Closed Book,不可使用計算機	Part I

2012/04/11

Manufacturing Processes

1. Name four categories of traditional manufacturing processes, and Gives 2 specific name of manufacturing processes in each categories and 20%
2. Name four categories of material type, and Gives material properties (mechanical, physical and metallurgical) of each categories 20%
3. (i) What is PVD? 5%
(ii) What is EDM? 5%

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(1) 請回答對、錯，並簡單解釋理由(10%)

- a. 應力單位 $1 N/mm^2 = 1 \text{Mpa}$ ，鋼的楊氏係數大約是 207MPa 。
- b. 應力與應變關係可以表示如下 $\sigma = E\varepsilon$ ，其中 E 為材料的抗拉強度。
- c. 扭轉一枝粉筆導致斷裂時，其斷裂方向一定和粉筆的軸成 45° ，是因為在這個方向上有最大剪應力的緣故。
- d. 脆性材料容許應力通常考慮採用材料的降伏強度(yielding strength) S_y ；延展性材料考慮容許應力時通常採用材料的抗拉強度(ultimate strength) S_u 。
- e. 結構受力時材料並沒有立即產生破壞，而是在反覆受力超過一定的次數後，才會發生破壞，此種破壞模式稱作應力集中。

(2) Identifying the customers, determining customer requirements, determining relative importance of the requirements, competition benchmarking, transferring customer requirements into measurable engineering specifications and setting engineering target for the design are the 6 standard steps of Quality Function Deployment (QFD). Draw the QFD table, and indicate the 6 steps on the QFD table (4%). Transferring customer requirements into measurable engineering specification is an important purpose of QFD. The product specification includes a "metric" and a "value". Use the mobile phone as an example to transfer the following customer requirements into measurable engineering specifications: light weight, large screen, and long battery life (6%).

(3) Draw a sketch to show a pair of spur gears meshing with each other. Specify the base circles, pitch circles, pressure line, and pressure angle (4%). Explain how "involute" is generated and why it is used as the shape of the tooth. (6%)

(4) 什麼叫做「設計規格(design specification)」？(5%)試舉出 5 個設計規格的例子。(5%)

(5) One year YZU ME students joined the fuel efficient vehicle design contest. We needed a 1:25 transmission system for high torque transmission. A student suggested using belt and pulleys as shown below. What are the possible problems of this design? (4%) Can you come up with a better transmission design? Use sketches, numbers, text, to give as much details of your design as possible. (6%)

