

# 國立中山大學 102 學年度碩士暨碩士專班招生考試試題

科目名稱：工程英文【機電系碩士班丁組】

題號：438001

※本科目依簡章規定「不可以」使用計算機

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## I、閱讀測驗 (第 1 至 11 題，每題 3 分，共 33 分)

說明：請閱讀下列文章，然後根據文章之文意回答下列問題，並寫在答案紙上，可以中文或英文回答。

Directions: Read a journal abstract below, and then answer the following questions by writing your answers onto the answer sheets.

### Friction stir welding for transportation industries

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Materials & Design, Vol. 18, No. 4 (1997) 269-273

This paper will focus on the relatively new joining technology – friction stir welding (FSW). Like all friction welding variants, the FSW process is carried out in the solid-phase. Generally, solid-phase welding is one of the oldest forms of metallurgical joining processes known to man. Friction stir welding is a continuous hot shear autogenous process involving a non-consumable rotating probe of harder material than the substrate itself. In addition, FSW produces solid-phase, low distortion, good appearance welds at relatively low cost. Essentially, a portion of a specially shape rotating tool is plunged between the abutting faces of the joint. Once entered into the weld, relative motion between the rotating tool and the substrate generates frictional heat that creates a plasticized region around the immersed portion of the tool. The contacting surface of the shouldered region provides additional friction treatment to the weld region as well as preventing plasticized material being expelled. The tool is then translated with respect to the workpiece along joint line, with the plasticized material coalescing behind the tool to form a solid-phase joint as the tool moves forward. Although the workpiece does heat up during FSW, the temperature does not reach the melting point. Friction stir welding can be used to join most aluminum alloys, and surface oxide presents no difficulty to the process. Trials undertaken up to the present time show that a number of lightweight materials suitable for the automotive, rail, marine, and aerospace transportation industries can be fabricated by FSW.

1. In which journal was this paper published?
2. When was this paper published?
3. Who wrote this article? State Only family names.
4. Indicate some of the advantages of FSW.
5. What are transportation industries?
6. What is the meaning of the term “solid-phase welding”?
7. What is the meaning of the term “a non-consumable rotating probe”?
8. What is the meaning of “creates a plasticized region”?
9. What is the meaning of the word “plunged”?
10. What is the meaning of the term “abutting faces”?
11. What is the meaning of the term “surface oxide”?

## II、英翻中(共 17 分)

12. Forging is a process in which the workpiece is shaped by compressive forces applied through various dies and tools. It is one of the oldest metalworking operations, dating back at least to 4000 B. C. – perhaps as far back as 8000 B. C. Forging was first used to make jewelry, coins, and various

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implements by hammering metal with tools made of stone. Simple forging operations can be performed with a heavy hand hammer and an anvil, as was traditionally done by blacksmiths. Most forgings, however, require a set of dies and such equipment as a press or a forging hammer.

## III、中翻英（每題 5 分，共 50 分）

13. 在工業上使用的銲接有許多的種類。
14. 鑄造是用在生產形狀較複雜的工件。
15. 最佳設計常常需要用到微分的方法。
16. 優良產品設計的核心在創造性思維。
17. 若與鐵相比鋼的許多機械特性較佳。
18. 學生常搞混材料的強度和應力應變。
19. 在機動學我們學習連桿凸輪與齒輪。
20. 四連桿組是種容易的單自由度機構。
21. 當有組合件時公差的設定更為重要。
22. 現今工程圖的製作已多是電腦化了。