光通訊元件之電阻銲接技術研究

學生：蕭永淙　　指導教授：周長彬 教授

國立交通大學機械工程研究所

摘　　要

本研究主要探討的是圓柱型雷射二極體模組構裝方式(TO-Can)，其封蓋(Cap)和基座(Header)採用浮凸電阻銲來做氣密封裝，所以 TO-Can 的封蓋與基座均需作環狀的銲接，以探討不同製程參數對低碳鋼接合之微觀組織及浮凸點塌陷(Projection collapse)之關係，並建立其低碳鋼接合之相關資料，在接合完成後再以氦氣測漏儀分析其氣密性，以能通過氦氣檢測來驗証確實為氣密性封裝。由實驗中發現可銲區之區域大小與電極頭材料性質有關，電極材料的硬度和導電率對可銲區均有直接的影響。金相微觀組織方面，在許多文獻中的電阻銲接實驗都有銲核的出現，但在本實驗中若將充電電壓調高至電極黏著的狀態時，並不會有銲核出現，其主要的原因為電容放電時間才 4.4ms 且材料為鐵類合金。若需強調銲件強度時，則可使用更長的銲接時間，或採用其它大功率的電阻銲接機。由測漏結果發現在相同的操作壓力下較高充電電壓有較好的氣密性，但過高的充電電壓則會使熱影響區加大，或使試片加壓變形。因此，建議使用可銲區的中間區域即可通過測漏，也可以確保有良好的電阻銲接品質。

Study on Resistance Welding Technology of
Optical Communication Devices

Student: Yong-Quan Xiao Advisor: Chang-Pin Chou

Institute of Mechanical Engineering
National Chiao Tung University

ABSTRACT

Microprojection welding is a variation of microresistance welding in which current flow is concentrated at the point of contact with a local geometric extension of one of the parts being welded. These extensions, or projection, are used to concentrate heat generation at the point of contact. Because of the dynamic changes of the flow paths for heat and electrical current and the variation of the material properties with changing temperature, the process of microprojection welding, not unlike other resistance welding processes, is difficult to analyze. This research was primarily relied on an all –experimental approach in which the heating process is qualitatively depicted using consecutive metallurgical cross sections. This analysis procedure is suitable for studying the electrical, thermal, hardness and mechanical aspects of the microprojection welding process such as the projection collapse mechanism, the HAZ formation process, and the effects of different welding parameters and electrode material properties. Finally, Helium Leak Detector system was used to test the device of high hermeticity. Based on the results of the present work, nominal process parameter were determined and recommended for micro-resistance projection of the TO-Can device.