

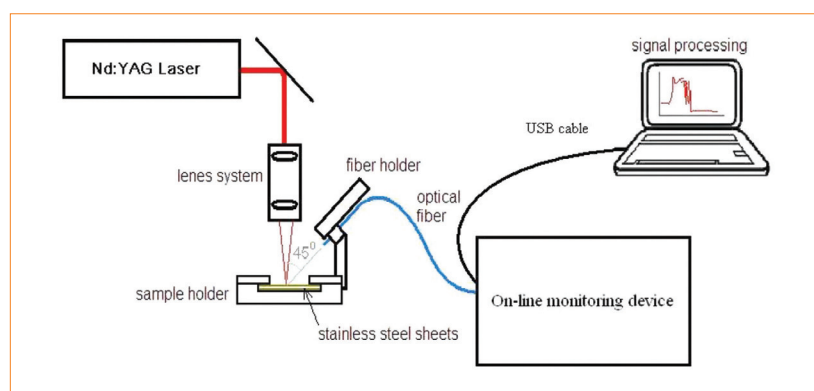
高速激光點焊監測系統

On-line Monitoring System for High Speed Laser Spot Welding

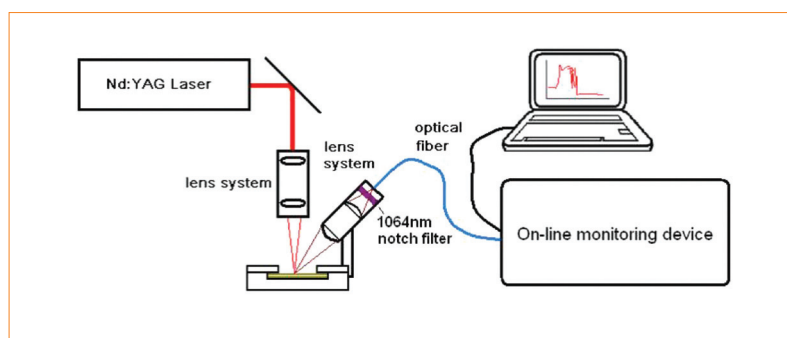
提供實時、高效且低成本的產品質量監控方案

A real-time, low cost and industry-ready welding process monitoring system

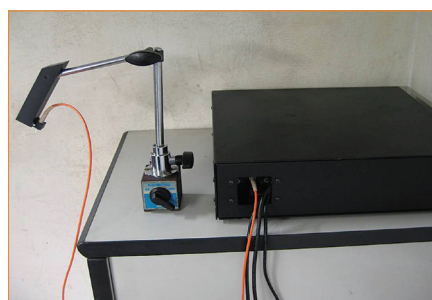
激光點焊是一種新型的高速無焊錫微焊接技術，常用於點焊金屬微部件等。可是現有激光點焊監測技術還不能應用於高速生產線上。本系統提供一種可行的激光點焊監測系統，通過收集焊接時熔池的輻射信號，以及熔池的冷卻信號，系統能在幾毫秒內計算及分析出點焊的品質。檢測過程快速但成本並不高昂，而且能夠與現有的激光點焊技術相容。



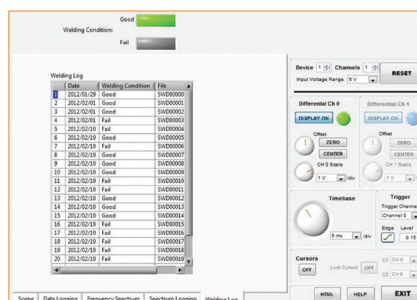
本發明的熔池輻射信號監測系統的結構示意圖
Schematic diagram of the laser reflected signal monitoring system



本發明的熔池冷卻信號監測系統的結構示意圖
Schematic diagram of the post-weld signal monitoring system



激光信號收集光纖和激光點焊監測系統的原型
The prototype of lap weld monitoring device and the signal detecting fiber



焊接資料記錄電腦控制介面
Computer control interface of welding data log

Laser welding has become the preferred process in industrial micro-joining as it does not involve solder and offers high production rate. However, there is no practical welding monitoring technology which suits the requirements in mass-production line. Our newly investigated system can monitor the welding process quality of tiny and complicate electronic components. In milliseconds, it can identify the welded spots quality based on reflected infra-red signals and the cooling rate of the spots. The invention can enhance efficiency and quality in the manufacturing of consumer electronic and medical products, in which micro-welding of metallic parts and hermetic sealing are the critical factors.

特色與優點

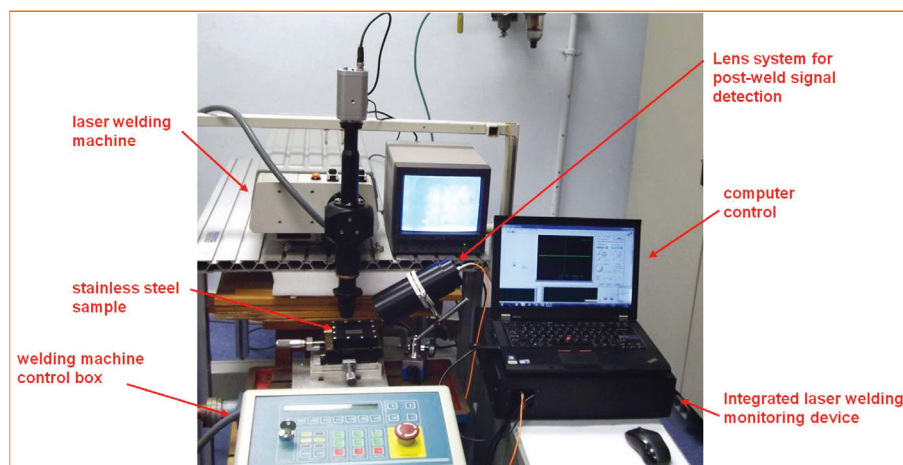
- 因處理及分析信號能力高，適用於高產能焊接生產線
- 雙傳感器設計(第一信號傳感器：激光點焊時，熔池輻射出來的信號；第二信號傳感器：激光點焊完成後，收集熔池的冷卻信號)，能達至更準確的點焊品質分析
- 它能於產品生產線上，進行非破壞性的品質監測
- 能夠與現有的激光點焊技術相相容，在現有的激光點焊設備上進行擴展
- 能記錄及提供每個焊點品質的可追溯資料
- 成本低及堅固耐用

應用

此線上監控技術能夠很簡易及方便地安裝於現有的激光微焊接生產線上，適用於消費電子產品和醫療器械的生產。此創新技術能有效提升工業的微焊接技術及微型化產品的品質

獎項

- 第41屆瑞士日內瓦國際發明展 - 金獎 (2013年4月)
- 羅馬尼亞代表團特別獎(2013年4月)



線上監測系統整合於激光焊接系統上
Photo of the integration of laser welding system and the on-line monitoring system

Special Features and Advantages

- Suitable for high production rate laser welding system because of the short processing time
- Dual sensing system for welding and post-weld infra-red signals can achieve high accuracy of inspection
- Enable on production line monitoring, instead of destructive test of the assembled product
- Easy to be adapted into existing laser welding system to monitoring each of the weld
- Provide traceable data on the quality of the weld
- Low price and robust system

Application

Our system can be easily adapted in the production line of miniaturized products (e.g. consumer electronic goods and medical devices, etc) to provide real-time identify fail products and help enhance reliability of the welds

Awards

- Gold Medal – 41st International Exhibition of Inventions of Geneva, Switzerland (April 2013)
- Special Award from the Romanian Delegation (April 2013)

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