

Research and Exploration of Automatic Welding Wire Technology for Horn

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ABSTRACT

With the development of science and technology, the electronic component industry has become more and more extensive, covering circuits, electrical and electrical systems from small to large. Many of these parts have very high requirements for the production process, and the production process requires a certain amount of workshop space. In the traditional production process, soldering is mainly manual welding. With the development of intelligence, impersonality and automation, the design of electronic products will gradually move towards intelligence. In this process, the application and promotion of welding technology is essential. In order to ensure the production of automatic products, this paper studies and discusses the function control problems and solutions of the soldering machine. Loudspeaker (commonly known as loudspeaker) is one of the most widely used electronic devices. With the development of the electronic industry and the change of the market environment, major manufacturers are developing new products to meet the market demand and product performance. In order to meet the needs of a large number of high reliability electronic products with different structures now and in the future, automatic welding technology is required to ensure that the welding quality and reliability have certain advantages.

1. Introduction

Due to the wide variety of electronic components and the increasingly high production process requirements, the traditional manual welding can no longer meet the market demand, so many electronic component manufacturers actively develop new automation products to meet the market demand and product performance requirements. In recent years, with the rapid development of automatic welding technology, this technology is expected to be widely used in the future. With the increasing demand for flexible electronic products in China, self-developed automation products, production technologies and supporting equipment have also emerged, effectively meeting the development requirements of the transformation and upgrading of the domestic electronic industry. This paper

takes industry as the research object, aiming to play the role of industry in research and exploration.

2. Technical Principle

The connecting wire between the horn and the circuit board is soldered together with tin wire. In the current production, most parts are manually operated and assembled. Now all electronic component manufacturers have adopted automatic horn soldering technology to meet the needs of large-scale production process. The adoption of automatic welding production line technology can improve production efficiency and effectively adapt to the development requirements of the transformation and upgrading of the electronic industry. The automatic welding line equipment is mainly composed of wire cutting part,

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welding part, visual inspection part, automatic loading and unloading manipulator, etc. The welding head is the core part of the automatic spot welder, and its quality and performance directly affect the subsequent welding effect. Therefore, the welding head must be carefully designed and selected in all aspects of the welding machine. There are many types of welding heads, which can be interchanged, but their functions are the same, that is, to use their own inherent functions to achieve good welding results in the welding process. The welding wire used for welding on the spot welder is mainly tin wire. High frequency soldering iron is used as heat source for tin wire welding^[1].

3. Design Analysis

This topic is developed on the basis of the existing automatic horn welding line equipment, including soldering mechanism, CCD vision system, wire cutting mechanism, automatic loading and unloading manipulator, PLC control system and fixture. The welding mechanism is composed of 2 high-frequency soldering irons and 4 precision tin breakers. The CCD vision system consists of two cameras^[2]. One camera is used for precise positioning, and the other camera is used for finished product inspection. The system aims to reduce errors and errors in manual operation. The design scheme is mainly applied to automatic processing and detection of horn soldering tin.

4. Analysis of Key Technical Parameters

In the production process, the quality of welding head is very important. Therefore, the design quality of the welding head is good, which can effectively ensure that the welding materials produce uniform molten pool on the workpiece. However, in practice, this problem exists. For example, for circuit board tin, if it does not meet its requirements, tin leakage may occur^[3]. Therefore, it is necessary to determine the appropriate welding head quality index from the actual project. The welding head is the core part of the automatic spot welder, and its quality and performance directly affect the subsequent welding effect. Therefore, the welding head must be carefully designed and selected in all aspects of the wire bonder. There are many types of welding heads, which can be interchanged, but their functions are the same, that is, to use their own inherent functions to achieve good welding results in the welding process^[3].

The control system mainly includes: cylinder control, manipulator control, welding workpiece, power switch and instrument system. The welding process of the workpiece is realized by rotating the cylinder with the manipulator.

As it is a semi-automatic production equipment, it can meet the following requirements: 1) High production efficiency: the equipment is mainly mechanical action, while the robot is mainly automatic action; 2) Simple operation: there is a big difference between manual mode and automatic production; 3) High safety performance: it is easy to generate sparks under mechanical action; 4) High welding quality: it can continuously and automatically complete complex point-to-point processing tasks to ensure safety; 5) Easy maintenance: high production efficiency and high degree of automation; 6) Good production environment; 7) High efficiency.

5. Function Design of Automatic Welding System

During manufacturing, most electronic products need to be welded to the motherboard to ensure consistency after assembly. After welding, the parts need to be put into the product for assembly. The system realizes the connection between the automatic welding equipment and the motherboard, making the entire automation system more perfect. The overall efficiency is greatly improved. The system can detect and locate by CCD vision, transmit the data to PLC and store it on the memory card, which maximizes the automation of the whole process.

5.1 Adopt Modular Design System

Adopt modular design to improve the overall efficiency. Classify the modularization degree of devices, and adopt different working methods for different device models (such as horn, PCB, buzzer, atomizer, switch, etc.). Automatic welding equipment has two working modes: full-automatic welding line and semi-automatic welding line. The working principle of full automation is to realize automatic loading and unloading, automatic thread cutting, automatic welding, automatic detection, and unmanned operation. Semi automatic welding line can realize automatic cutting and automatic welding, which requires manual loading and unloading and manual detection. The automatic welding device of the utility model enables the operator to carry out automatic welding more flexibly and conveniently through the mechanical control mode.

5.2 Fully Automated Working Process

First, the wire enters the straightening mechanism and straightens the wire. Then enter the wire cutting and peeling stage, dip one end of the cut wire with tin to avoid loose copper wire, and then weld the other end on the welding point of the horn. At the same time, the CCD

camera recognizes the direction of the horn to realize automatic feeding, and the CCD camera detects whether the welding is good. To ensure that the finished products are completely qualified. If any nonconformity is found, alarm and mark it as defective product,.

5.3 Test Function

In order to ensure that the size of the welded horn meets the requirements of the standard specifications, ensure the assembly accuracy, and thus ensure consistency, it is necessary to carry out spot welding assembly positioning and testing. After the test, check the data through a series of methods to verify the reliability of the connection, and then store the data on the card and upload it to the computer^[4].

5.4 Safety Device

In order to prevent dangerous accidents, safety devices must be installed on automatic welding equipment to prevent damage to products and casualties. Safety facilities include access switches and safety gratings. When the equipment is running, open the door or touch the safety grating, the automatic welding system will give a fault alarm and stop the operation at the same time to ensure that no casualties occur. The safety device is equipped with overflow protection, overload protection and short circuit protection. When overflow protection is set, fire can be prevented by external circuit short circuit. Too strict protection can avoid the risk caused by too long overload time.

6. Full Automatic Welding Machine Control System Process

The working process of the automatic wire bonder control system is as follows: 1) When the welding equipment enters the preparation state, the confirmation of air pressure and voltage is required; 2) If the air pressure is insufficient or no air pressure is found, the equipment cannot operate^[5]; 3) A reset is required after everything is ready. 4) Press the start operation button, the equipment will automatically carry out direction identification, automatic feeding, straightening, cutting, peeling, tin dipping, wire feeding, welding, detection, blanking and a series of automatic operation actions; 5) When the tin wire is used up or broken, the equipment will give a warning, which requires manual handling; 6) When the small tin dipping furnace is used for a certain number of times, the equipment will automatically clean the tin slag. The method adopted in the system design is to monitor the operation steps and parameters of the welding machine in real time through

the intelligent terminal. Connect the servo motor with the cylinder drive circuit through the serial port, make the servo motor rotate in the corresponding direction, and realize the real-time monitoring and evaluation of the welding machine movement and parameters according to the predetermined program commands. Through the corresponding interface, you can see all the relevant data information of the product during welding.

6.1 Faster Welding

All parameters and resistance of the power supply before welding shall be within the standard range. If the requirements are not met, it is impossible to complete the specified range. In actual operation, general welders will not interrupt their own welding process according to the actual situation. In order to ensure that the current meets the stable parameter range, the current is often adjusted during the welding process. However, the common practice at home and abroad is to heat the welding machine with several sets of heating tubes to maintain the normal operation of the welding machine. From the practical operation, the wire bonder can be heated in a short time by using a high-frequency temperature controller, which will produce a better welding effect.

6.2 Prepare for Fusion

In the operation of automatic welding machine, broken tin wire is very important. It can achieve accurate and fast welding. Therefore, it is necessary to constantly adjust the pressure to make the tin breaker achieve the desired effect..

6.3 The Current Switch Closes Automatically

The inverter can control the motor speed by controlling the motor speed, and then change the welding current to reduce noise. Judge whether to execute the next operation according to the detection signal, and adjust the corresponding operation of the controller. The control part is controlled by the microprocessor and can be closed intermittently during welding. Other sensors monitor the movement of welders and welding equipment and detect the presence of joints.

6.4 Protection Function

The automatic welding machine system does not take action against some faults in the production process, but only to ensure the normal operation of faults, and also to ensure production efficiency. Therefore, in the normal production state, the automatic welding machine should be well protected in case of failure. There are two main

protection modes: one is to automatically turn off the protection function in case of welding failure (that is, take measures immediately to stop the machine when a failure is found); The second is the safety protection function (that is, in the safety protection state, it can effectively avoid the damage to the operator caused by the fault) The system design mainly adopts two methods to achieve the above functions, one is to install voltage protection for the welding machine. Second, set the protection function (that is, in case of failure, the protection function will be automatically closed. When the welding signal changes, the protection function will automatically terminate).

7. Conclusions

At present, the automatic welding line equipment has been successfully applied to the production of various electronic components, providing great help for electronic component manufacturers. Nowadays, the performance of electronic products is getting higher and higher, and the requirements for automation, product quality and service quality of manufacturing enterprises are also getting higher and higher. With the improvement and innovation of wire bonder, the automation level of wire bonder will be higher and higher, and the efficiency of wire bonder will be higher and higher. Traditional manual labor not only consumes a lot of time and energy, but also has a certain impact on the production environment. The automatic

welding line equipment is mainly studied to make it have high response speed, low vibration, high efficiency and other performances. The automatic feeding, welding and blanking with high efficiency and stability can improve the production efficiency, meet the labor demand in the production process, and reduce the cost and pressure of the production enterprise.

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