饮料灌装生产线的 PLC 控制系统设计

摘　要

饮料灌装生产线主要按照饮料的空瓶检测和传输带运行,通过灌装电磁阀控制瓶子灌装，以及加盖电磁阀动作，实现饮料灌装的过程，根据大瓶和小瓶的选择，进行不同的灌装，并且进行计数的工艺设计需求，对系统进行硬件和软件设计，通过调试和仿真达到设计工艺的要求，满足设计的需求。系统采用顺序控制的方法，进行论文的程序设计，系统主要通过可编程控制器+上位机控制方式进行设计，在分析该系统的工艺要求基础上，提出详尽的控制策略和总体设计思路。

系统主要由西门子 S7-200 可编程控制器、传感器检测单元、电动机执行机构等组成，系统分为总体设计、硬件图纸设计、软件流程及程序设计以及组态王上位机仿真设计等。在总体设计中对系统工艺进行详细分析，并提出总体设计的思路；在硬件设计中重点对 PLC 及其他接线进行详细设计和分析；在软件设计中，重点对程序流程进行分析，并完成软件程序以及上位机组态设计。系统设计通过仿真设计和调试，达到了设计的基本控制要求，控制逻辑清晰，功能实现满足了工艺的需求。

关键词：饮料灌装生产线；可编程控制器；组态王；顺序控制

Abstract

The beverage filling production line is mainly operated according to the empty bottle monitoring and conveyor belt, Through the filling solenoid valve to control the bottle filling and the capping solenoid valve action, the beverage filling process is realized. According to the selection of large and small bottles, different filling is carried out, and the process design requirements of counting are carried out. The hardware and software of the system are designed, and the requirements of design process are achieved through debugging and simulation to meet the design requirements. The system adopts the method of sequence control to carry out the program design of the paper. The system is mainly designed by the way of PLC + upper computer control. Based on the analysis of the process requirements of the system, the detailed control strategy and overall design idea are put forward.

The system is mainly composed of Siemens S7-200 PLC, sensor detection unit, motor actuator, etc. the system is divided into overall design, hardware drawing design, software flow and program design, and configuration king upper computer simulation design, etc. In the overall design, the system process is analyzed in detail, and the overall design idea is proposed; in the hardware design, the PLC and other wiring are mainly designed and analyzed in detail; in the software design, the program flow is mainly analyzed, and the software program and upper computer configuration design are completed. Through simulation design and debugging, the system design has achieved the basic control requirements of the design, the control logic is clear, and the function realization meets the process requirements.

Key words: beverage filling production line, PLC, Kingview, sequence control