

Used Bottle Washing System

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- Abstract:

This process is designed for washing and drying empty used glass bottles. Washing this glass bottles is a time consuming and risky operation. Earlier this operation was carried out by humans causing serious issues such as human errors, mistakes in glass bottle handling which can cause injuries to employees, etc. So, in this paper we have proposed the automatic glass bottle washing and drying system in order to resolve the problem of the employees. In this system we are using programmable logic controller (PLC) as main controller. Some of the main benefits of this system are high productive, reliable, accurate, cost effective.

- Introduction:

For reusing used glass bottles, we need to wash them carefully with all safety precautions. For washing this bottle, we have to conduct various operations due to which bottles will get ready for reusing or filling with product. In this project firstly bottle cap metal ring around bottle neck is removed. In next process cleaning of bottle from inner and outer side is done. After that bottle is rotated at 180 degree to remove all cleaning agents inside the bottle. And after that bottle is sent for drying purpose.

Literature Review:

Ankur G. Gajjar [1] In this paper temperature is the most important parameter to be considered in washing glass bottles for small scale beverage industry. Here proportional integral derivative (PID) controller used as main controller. The reference temperature is given to the PID controller and the temperature of the water inside the tank is measured by PT-1000. The error generated between reference temperature and the resistance temperature detector (RTD) temperature decides the output of PID controller. The output is then given to the Solid-State relay which acts as an actuator for the water heating tank system. Here two process of PID controller tuning takes placed

1. Ziegler Nicholas Tuning method
2. Auto tuning method

The error generated is used to wash the glass bottles efficiently and safely.

A. Schoning [2] Bottle washer machine is limited to large scale industries due to their high bottle washing capacity. This paper proposes a system which can be used in small scale industries. The controller used here is siemens PLC. For the level control of water in the tank limit switches are used and for temperature control PT-1000 is used. The used Returnable glass Bottles (RGB) is passed to the infeed block. From the infeed block the bottle passes through the next step that is preheating, precleaning, rinsing and other water treatment methods and at the end the bottles are discharge through the discharger system.

Wirat Kumchoo [3] This paper proposes a system for the inspection loose cap and safety ring of glass bottles using image processing concepts. The glass bottle cap is split into two areas first is thread cap area second is the area between the thread cap and safety ring. In this the image of the RGB is taken and sent to pre-processing unit where RGB image is converted to hue, saturation, value (HSV) colour space. Then the HSV image is sent to feature extraction unit where the defects in the glass bottle ring are found out such as fracture in the ring etc. then the image goes to decision unit where the analysis of image is done and lastly the result of the detection of glass bottle cap is displayed through image processing.

R. Goncalves [4] This paper consists of radio frequency identification (RFID) tag antenna system used for labelling glass bottles. The RFID tag is placed on substrate on a glass bottle. It is like a barcode which when scanned gives all the information of the bottle like when it is manufactured, packed, dispersed, etc. The RFID tag can also be used to track the glass bottles from anywhere in the world using a unique address. Each RFID tag has a unique address given to it. instead of printing all the information on the glass bottle a RFID tag can give all the information needed. All the information

about the glass bottle is stored in the RFID tag database. This information is accessed when we scan the RFID tag. So, the RFID tag antenna system is widely used.

H, Liu [5] The system proposed in this paper is computerised system used for the inspection of empty glass bottles using machine vision. In this system the features of empty glass bottles are extracted with the help of fuzzy extractor machine. It also consists of a fuzzy support vector machine and neural network which classifies the features of empty glass bottles. After classification of the features the decision takes place. The results are displayed and depending on the results the empty glass bottles are selected for the appropriate experiment. The result decides the accuracy rate for the empty glass bottle used in the experiment. If the accuracy rate of the empty bottle is above 90% then the glass bottle is fit for that experiment. This system is also used for to check the durability of the glass bottles required in the experiment.

R, Ribeiro [6] This paper proposes a modelling system for the implementation of a wine bottling production line. The aim of this paper is to create a prototype of wine bottling plant and its real time control in automation. The concept used in production line is object oriented. If a equipment from one vendor is to be interface with the equipment from the other vendor then a solution is to be needed for the smart working of the production line. It has a processing unit for the processing of glass bottles and fill context machine for the filling of the fluid. It also consists of a high-level state required for the production line.

I. Expositu [7] This system is for the readability around wine bottle boxes. When the wine bottles are packed in a cardboard box and every individual wine bottle has RFID tag fitted on it. The RFID tag becomes invisible for the computer system to be tracked because of cardboard box. If a RFID tag is fitted on a cardboard box containing six wine bottles then the that cardboard can be tracked from anywhere in the world. So, the readability of RFID tag sometimes become invisible because of the box covering the tags and sometimes it is visible. This system however is one the best method to tracked individual wine glass bottles. Due to some interference of the signal or object covering the tags reduces the readability factor of tags and it becomes invisible for computer system.

Henry. K. Griffith [8] This paper proposes system in which an inertial measurement unit (IMU) sensor is used to track fluid consumption in a particular container. The sensor is connected to container. It also describes the type of container. There are three types of containers first is refillable bottle second is glass bottle and third is mug. The sensor is also used to trace the container parameters from remote location the IMU sensor tracks the fluid consumption of the container to which it is connected. The IMU sensor is also used to classified fill level according to type of container. If the fill level rate of the container is 100% accurate then the performance of IMU sensor increases. Using a computerised system, we can not only track the containers parameters but also keep a record of the data by connecting a data logger to the sensor.

Jerome. A. Kwiatkowski [9] The system proposed in this paper is a electronic programmer for IS bottle making machines. The programmer is operated on actuators that are used to trip control valves. This system is also used in automatic glass blowing machines. It is used to set the electronic timing of glass blowing machines. There is operator station near the machine from which the operator can change program from the programmer and store it on a secondary device that is on a magnetic tape. The programmer can be used to control several machines remotely and safely without any disturbance. The programmer can only be applicable for bottle making machines. It is used to set all the parameters in glass blowing machines.

Jacob. Ben [10] This paper proposes a system to find out bottle parameters such as temperature, soaking time, and NAOH concentration. The glass bottles pass through the water treatment methods such as preheating, cleaning, rinsing, etc. after this water treatment process the glass bottles passes through empty bottle inspector where it check for defect in the glass bottles such as damage or fracture in the safety ring etc. only clean bottles are passed through next stages such as filling, crowning, labelling, packing, etc. the three parameters discussed above together bottle washer data which is used for the analysis of the glass bottles. This bottle washer data increases the performance of the bottle washer machine highly.

Conclusion:

After reading the above literature review, we understood that there are many issues that can be solved with the help of automation. The advantages of using automation are low maintenance, high productivity, preciseness, etc. The system that uses automation is reliable to use, in this paper the system also uses automation to make glass bottle washing easy and safe. All the the process is operated on plc controller. The PLC controller runs all the operation in this system in an efficient way.

References:

- 1.Real time implementation of model predictive control (MPC) in bottle washer machine for small scale beverage industry. - Ankur G. Gajjar
- 2.Design and development of bottle washer machine for small scale beverage industry. - A. Schoning
- 3.Detection of loose cap and safety ring for pharmaceuticals glass bottles - Wirat Kumchoo
- 4.UHF- RF ID tag antenna for bottle labelling - R. Goncalves
- 5.Development of computerised method to inspect empty glass bottles -H, Liu
- 6.Hardware/software solution for the automation and real time control of wine bottling production line -R, Ribeiro
- 7.RFID readability around wine bottle boxes-I. Expositu
- 8.Container Type and fill level classification using a bottle-attachable IMU sensor - Henry. K. Griffith
9. Electronic timing of automatic glass blowing machine -Jerome. A. Kwiatkowski
- 10.Optimizing bottle washer performance in cleaning RGB for reuse in beverage packing - Jacob. Ben

