AUTOMATIC YEAST FILLING AND SEALING MACHINE USING PLC

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Abstract - *Filling is the process in which the machine packs the yeast in a bottle. this method include placing bottles onto a conveyor belt and filling the bottle once at a time. the aim of this paper describes the method of filling yeast in a bottle with correct weight by using load cell. In a conveyor system stepper motor is used for its efficiency. Filling is controlled by LOGO PLC using ladder logic method. in a bottle filling system PLC gets the filler sensor feedback and control the gate valve. After filling the yeast the bottle moves towards the sealing section ,two bottles are sealed at a time. By programming the PLC the entire system is being controlled. Sensor stand as a most important part for yeast filling. Normally in all automation industries PLC is used as a heart of any system. The entire system is made more flexible, time saving and user friendly. Every result leads to the conclusion that the operation of PLC is very inspiring.*

Key Words: **logo PLC, filler sensor,conveyor belt, gate valve, HMI.**

1. INTRODUCTION

Automation is used for all control system and the technologies is to reduce the human work, helps in increasing the production, reduce the complexity, cost efficient, increase safety. PLC plays a important role in the world of automation industry. In this system we have applied a PLC based control system in an automatic yeast filling station. Ladder logic is used in this process. The filling operation is based on the user-defined volume through which user can choose the volume of liquid to be filled. A sensor which is placed in the conveyor, is used to sense the bottle placed under the tank and the corresponding tank is switched on to fill the bottle[2]. Filling is done by using various methods using motor, sensors, conveyor belt, PLC, solenoid valve.

2. LITERATURE SURVEY

[1] Automatic bottle filling system for different sized bottles:

Ameer L. Saleh1, Lawahed F. Naeem 2et al describes automation is the utilization of different control techniques for operating equipment's such as operations in factories, aircraft and other applications with reduced human power. The filling process is a mission performed by a machine that fills liquid products such as water or cold drinks. Traditional bottling methods include placing bottles on a conveyor belt and filling only one bottle at a time. In this paper, it has been designed and implement water filling machine system for different sized bottles by using PLC. Where the water filling

machine system includes design and implement prototype of a flat belt conveyor with dimensions (120*70*30) cm and automatic process for water filling machine using the solenoid valve and sensors which gives the appropriate information to control unit then design the controller using PLC. The PLC plays important role to implement automatic filling process by using PLC programing software and ladder diagram language. It was found that the water filling machine using PLC is less operational cost and less power consumption than the traditional control systems, in addition more flexible and time saving.

[2]PLCBASEDAUTOMATICLIQUIDFILLINGSYSTEM

D.Baladhandabany, S.Gowthamet al describes the filling process in which a machine packs the liquid products such as water, cool drinks etc. This method includes placing bottles onto a conveyor belt and filling bottles one at a time. This aim of this paper is to describe the methods for filling more than one bottle at a time. In a conveyor system, stepper motor is used for its efficiency. It includes the user defined volume selection at the desired level. Our system includes less number of sensors, so it is less expensive. Filling is controlled by PLC (Programmable Logic Controller) using ladder logic method. In the bottle filling system the PLC gets the sensor feedback and controls the solenoid valve timing as well as controls the conveyer belt. By programming the PLC, the entire system is being controlled. Sensor stands as the most important part for bottle filling. Normally in all automation industries, PLC is considered as the heart of any system. The entire system is made more flexible, time saving and user friendly. Every result leads to the conclusion that the operation of PLC in is very inspiring.

[3]Automated Bottle Replenishment Plant using PLC

P.K. Das1, V. Kumar2 et al describes the Programmable Logic Controller, PLC is a digital computer used for automation. It is an interface between program and the inputs. It is a programmable software. A PLC is an example of a real time application and therefore used to control various devices. The PLC works depending by the inputs given and their state, turning on/off its outputs. The user enters a program, usually through software which gives the results. PLC is used in many "real world" applications. For all application
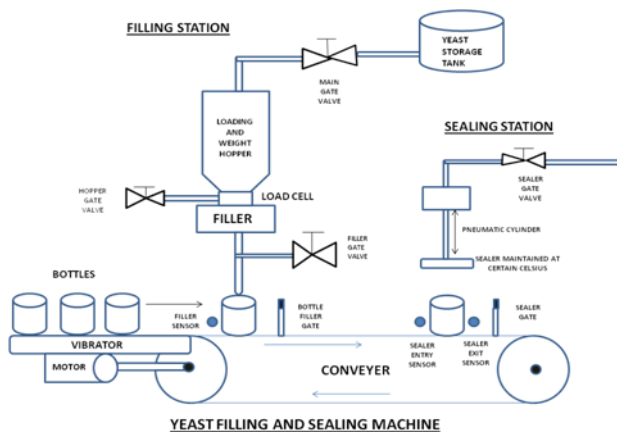
Functional Block Diagram

Fig -1: Functional Block diagram of yeast filling and sealing machine

Programmable Logic Controller(PLC)

A Programmable Logic Controller, PLC is a digital computer used for automation. It is an interface between program and the inputs. It is a programmable software. A PLC is an example of a that needs some type of electrical signals, PLC works on the basis of inputs given by the user. Automation is used for all control systems and the technologies in PLC is use to reduce the human work and helps in increasing the production. PLC plays an important role in the world of automation industry . It acts a major function in the automation field which tends to reduce the complexity, increases safety and cost efficient. In this system we have applied a PLC based control system in an automatic bottle filling station

3. EXISTING METHOD

The existing process is filling and sealing the yeast manually. Manual sealing is to be done in moderate heat. For that cooling process is needed , it takes more time, production decreases, manpower increases and also increase the expense.

4. PROPOSED METHOD

The numerous benefits of our automation project solution includes safety and security, energy savings, money savings, convenience, control, productivity increases. The human intervention in this process will take long time and the product will reach the customers in delay, so this process is fully automated by using PLC .

real time application and therefore used to control various devices. In other words, the PLC is an electronic(solid state logic elements) device designed to operate as industrial computer which reduces the need for manpower and increases productivity with less time and cost. All types of PLC are consist of a power supply, central processing unit (CPU), memory, input/output(I/O) modules and

programming device. The physical connection between the input and output module is done by the programming unit. Where the PLC acts as an interface to the real world through the input/output modules. All logical and control operations are done by the CPU which is the heart of the PLC. PLC has many programming languages but the most famous and important language is Ladder diagram language which are used to programming the PLC in this paper.

Description of Conveyor System

Nowadays with many industrial applications, a conveyor system is used to move object from one location to another in effective way to reduce losing time and effort and it is very useful in packaging process. A conveyor system has several forms but in this paper, a Flat belt type is used to move the bottles. Conveyors are especially useful in applications which including the transportation of heavy or large materials. A Flat belt conveyer has a dimensions of (120*70*30)cm the belt is made from elastic material. Six pulleys a distributed along the belt, the first one rotates with the rotation of motor shaft and it usually called drive pulley and the other five pulley called idler pulley[4]. The Flat belt is fitted with aluminum plate between the pulleys to support the belt.

PNEUMATIC CYLINDER

Pneumatic cylinder (sometimes known as air cylinders) are mechanical devices which use the power of compressed gas to produce a force in a reciprocating linear motion. Like hydraulic cylinders, something forces a pison to move in the desired direction. The piston is a disc or cylinder, and the piston rod transfers the force it develops to the object to be moved. Engineers sometimes prefer to use pneumatics because they are quieter, cleaner, and do not require large amounts of space for fluid storage. Because the operating fluid is a gas, leakage from a pneumatic cylinder will not drip out and contaminate the surroundings, making pneumatics more desirable where cleanliness is a requirement. For example, in the mechanical puppets of the Disney Tiki Room, pneumatics are used to prevent fluid from dripping onto people below the puppets.

WEIGHT HOPPER

Weighing device provided with: a large input weighing hopper in which, by supply of a subject to be weighed that has the weight of less than the target weight of the subject to be weighed, the subject to be weighed is weighed and the subject to be weighed after weigh-in is ejected; a plurality of middle input weighing hoppers (64, 65, 66, 44) in which, by supply of subjects to be weighed that are obtained by adjusting the weight of the subject to be weighed at the different ratio, combination calculation based on the weight of the subjects to be weighed is performed, and the subjects to be weighed are ejected on the basis of the result of the combination calculation; and a loss-in-hopper (42) that is used for loss-in- measuring and performs loss-in-ejection of the subject to be weighed.

FILLER SENSOR

Model M-OBF4 Bottle filler shall be activated by a 9 volt sensor or the push-button as standard. Unit shall contain a 100 mesh inlet strainer, lead and cyst filter, 6-AA battery pack and laminar flow spout. Construction shall be heavy gage, all stainless steel and pedestal base of bottle filler shall have four mounting holes. Access covers shall be secured with vandal-resistant stainless steel screws. A self-closing push-button, needing less than 5 pounds force, shall activate an internally mounted valve.

5. CONCLUSIONS

The main objective of this paper was to develop an automatic yeast filling and sealing machine based on certain specifications. This was successfully implemented. We consider this paper as a journey where we acquired knowledge and also gained some insights into the subject which we have shared in this report. A lot of additional features like user defined volume specification etc. were added in the different stages in our work and the desired results were obtained. PLC was used to control the various operations and monitoring was done using SCADA. More features can be added to this system as follows: depending on the size, shape and weight of the bottles, filling and sealing operations can be implemented.

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