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"A Review Based On Plc For Mixing And Filling Of Liquids"

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Abstract— In today's fast moving world for survival of company many factors are important such as, cost effective production flexibility of work according in work , production on time etc. In this paper we are going to survey about the liquid mixing and bottle filling process using PLC. The importance of use of PLC is that will allow the mixing of different liquids in desired amount ,the high speed process, accuracy in amount of liquid to be fill into bottles and in any case liquid is any chemical which is dangerous to human health then the mixing and filling both processes are carried out without human touch.

I. INTRODUCTION

This research is to design and develop the "Two Liquid mixing And Bottle Filling Using PLC ".As this project is based on Automation the word 'auto' means without having human interaction and 'mation' means moving. In many automation processes it is necessary to achieve designed demand in some specified time. For EX- if the production rate is 20 bottles per minute and demand increases to 50 bottles per minute the operating speed need to be increased, where if the demand drops abruptly the production rate need to be decreased.

In this project two liquids are mixed using PLC (Programming Language Controller) in a equal proportion. By comparing PLC with a personal computer. It has been see that PLC is designed to exist in any rugged industrial atmosphere and it is very flexible. In earlier days when there was no automatic work is going on the two liquids are mixed by the humans but they are not in equal proportion the

precision is required so we are going for the automation liquid filling. The PLC having an option called as proportion or timer as the timing is given to the two liquids then these two liquids are mixed in equal proportion. Although the PLC 's are costly, still those are also used in industries.

II. SURVEY

There are different aspects in terms of design and implementation for this purpose here focused on several methods by doing survey.

First we discussed regarding design aspects.

1)sensors:-

Sensors are the device that are used to detect and respond to electrical signals. A sensor converts the physical factor to electrical signals which is to be measured.

Proximity sensor:-

Proximity sensors are the most commonly used and these are non- touch object detection. Most commonly used proximity sensors are inductive.

As we see there are many types of sensors are available in market out of which we have selected only four basic proximity sensors.

1)Capacitive sensors

2)Inductive sensors

3)Photoelectric sensors

4)Magnetic sensors

1)capacitive sensors:-

Capacitive sensors are used to detect metallic as well as non – metallic objects.(liquids, plastic ,human hand, wooden materials etc.). In capacitive type sensors when any object comes in presence of sensitive side, an electric circuit inside the sensor begins to oscillate. This oscillation gives the presence of object.

2)Inductive sensors:-

Inductive sensors are used to detect only metallic objects. The principle of operation is based on a coil and high frequency oscillator. As any object comes in presence of these sensors it produces a change in oscillation amplitude.

3)Photoelectric sensors:-

A light sensitive element is used in a photoelectric sensors and which is used to detect the objects and made up of an emitter(light source) and a receiver.

4)Magnetic sensors:-

Magnetic sensors are operated in presence of a permanent magnet. The operating principle is based on the use of reed contractor, which is having two low reluctance Ferro-magnetic reeds enclosed in glass bulb containing gas.

Table no.1:-

Srno.	Parameter	Capacitive	Inductive	Photoelectric	Magnetic
1.	Operating distance	0-20mm	2mm	20mm	10mm
2.	Power supply	10-60vdc	10-30vdc	10-30vdc	-
3.	Switching current	200mA	200mA	200Ma	-
4.	Operating freq.	10khz	1khz	700hz	230hz
5.	Light source	No	No	Infrared	No
6.	Magnet	No	No	No	Yes

2)solenoid valve:-

A solenoid valve is an electromechanical operated valve to control the flow of liquid.

According to the application there are following types are available:-

a) 2-way solenoid valves:-

They have two ports (one inlet and one outlet) and operation is based on.

i) Normally open :-

These opens when the electromagnet or coil is energised.

i)Normally closed:-

These valves are close when the electromagnet or coil is energised.

b) 3-way solenoid valves:-

They have three ports and two are operating passages, one always open.

i)Normally closed:-

2 = inlet

1 = outlet

0 = exhaust

i)Normally open:-

0 = inlet

1 = outlet

2 = exhaust

FEATURES:-

- 2-way normally closed.
- Offers automated calibration.
- Provides repeatability across it operating range.

3)PLC(Programmable Logic Controller):-

In the market there are many PLC's are available few of them are listed bellow:-

1)Allen Bradley (Micro Logix1400):-

2)Mitsubishi:-

3)Delta:-

4)Siemens:-

1)Allen Bradley (Micro Logix1400):-

(i)Line voltage:- 24vDC.

(ii)Memory size:- 20Kb,10Kb.

(iii)Number of inputs:-(12)Fast24vDc,(8)Normal 24vDc,(2) Analog.

(iv)Number of outputs:-(6)Relay,(3)Fast Dc,(3)Normal Dc,(2)Analog.

(v)Programming language:- Ladder Diagram.

2)Mitsubishi:-

(i)Power supply:-Ac 110-120v/220-240v

(ii)Number of inputs:-24ports.

(iii)Number of outputs:-16ports.

(iv)Programming language:-Ladder diagram, Structural text.

(v)Embedded Timer.

3)Delta:-

(i)Power supply:-100-240vAc

(ii)Power consumption:-80vA

(iii)Operating temperature:-0^{*}c-55^{*}c.

(iv)Input impedance:-47Kohm.

(v)Response time:-10msec.

4)Siemens (Simatic):-
(i)Supply Voltage:-24vDc.
(ii)Starting current type:-11mA.
(iii)Total I/O Digital channels:-256/256 max.
(iv)Programming language:-LD,FBD,ST,GRAPH.
(v)RAM:-16Kb for program and data.

Till now we have seen the different component survey, and now we will see different survey based on our project.

1)Hybrid method of automatically bottles filling using PLC&SCADA and we can visualize it on SCADA screen[1]. In this project they have operated & controlled automatic filling of bottles and sitting far away from the plant and we can change all the parameter of the process using SCADA technology because SCADA system is used as supervisor or monitor the process.

It is usually applied application of PLC they are mixing more than two liquids in a certain quantity. The flow of liquid is already fixed. They are only controlling the flow of liquid by giving the timing using PLC. The sensors are used to detect the liquid level to avoid wastage of the liquid. As per the level of the bottle the ratio of mixed liquid is fixed. There are different liquids which are coming from the tanks are mixed in a separate tank by using stirrer motor. The bottles are kept in position in a carton over conveyor belt; the capacitive sensors is used to senses the presence of bottle as the bottle is sensed conveyor will stop. The valve is open and the bottle is filled.

As per our work that a total control is made in a filling as procedure. The present system will provides a great deal of applications in the field of automation, especially in mass production industries where there are large number of components to be processed and it takes less time to operate and it helps to rise production.

2) They proposed a system filling management automatically for industry application [2]. This project is totally based on automation. PLC is used to control the various processes and remotely controlled by PLC and SCADA is the heart of the system. The sensor is a input to a PLC. The sensor is a proximity sensor which is used to sense the presence of bottles. Instead of proximity sensor infrared sensors are also being used for this application. As the proximity sensor senses the presence of bottle the signal is send to the PLC. Also PLC will start the DC motor to mix the two liquids in a third tank. Depending upon the timing of the valves the liquids are filled in the bottles. SCADA is used to supervise the whole plant on a single computer. SCADA is used to start and stop the plant.

This paper concludes that an application of automation in which it made a fully automatic untouched liquid filling system which based on PLC.

3) PLC Based Automatic Bottle Filling and Capping System With User Defined Volume Selection.

[3] In this proposed system over a conveyor In a carton bottles are kept in series of queue belt; these bottles are sensed by the sensors and detects their presenc.IR sensors are used instead of proximity sensors. Depending upon the output of the sensors motors are on and filling is done. If the particular bottle is not present then the valve will not open and hence this will avoid the wastage of the liquid. The volume of liquid is fixed by the user. The filling liquid is based on timing.

In this work we have focused to develop a bottle filling and capping system. features like user defined volume specification etc. and then added in a different stage and we get a result.

III. METHODOLOGY

As taking all points from above journal papers we will implement our system methodology by using PLC program for mixing and filling of two liquids in a equal proportion. The two separate tanks having two liquids these two liquids are mixed in a third tank. To reduce the assembly we are not going to use any kind of mixer to mix these two liquids. The PLC having a function known as Timer when the timing is given to the valves then these valves will operate .These valves are connected at the output of the tanks. Fig.1.shown that . If suppose timing is given for 5sec then two liquids are mixed in a third tank. Then for the filling purpose we will also give timer to the third tank. As the proximity sensor senses the presence of bottles then the

conveyor will stop and bottle which is detected is filled.

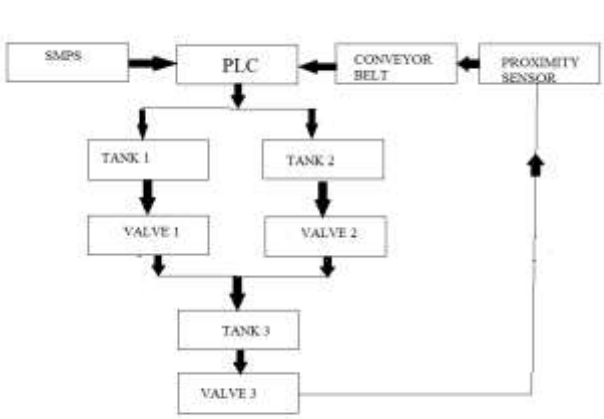

Fig1. Block diagram.

IV. CONCLUSION

This project has proposed an application of automation illustrating a PLC based fully automatic untouched liquid filling and mixing system.We get result of high-speed production at least mechanism requirements. Our system effectively avoids unnecessary spill or wastage . The system also provides high accuracy and precision in proportion of liquid filling and mixing. In this system it illustrates the mixing process of two liquids, any number of liquids may be diverse in different proportions. It is true that the use of PLC is a costly affair particularly for small companies except it offers more than one advantages which overcome its cost.

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