

“Liquid Mixing and Filling with PLC Based on Automation”

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Abstract— In this 21st century humans are totally depends on machines which makes our work easier and reduces human efforts. In this project two liquids are to be mixed and filled in the bottles. This project is totally time consuming and reduces human efforts. As this project is based on automation so the maintenance is low and production rate is high. Now a day’s many companies are using this project like coke cola and many more.

Key words: Liquid Mixing, Automation

I. INTRODUCTION

As this research is based on Automation two liquids are mixed and filled into the bottles using PLC (Programmable Logic Controller). PLC is a digital electronic device which stores the program takes the action accordingly. PLC is design to replace mechanical relays, timers and counters.

The whole plant is controlled by the PLC is just like a heart of the whole plant. In this project the two liquids are mixed in a third tank and then filled into a bottle using valves these solenoid valves are open and close accordingly as the bottle is sensed by the sensors on the conveyor. In earlier days when the two liquids are mixed by humans then these liquids are not mixed in a equal proportion so there is no precision of work by using the PLC we can see that two liquids are mixed in an equal proportion and well quantity. This avoids wastage of liquids as we know PLC has its own in built timer so the timing is given to the valves the valve will operate, As the PLC are costly but still they were used in industries. By comparing PLC with a microcontroller, PLC is more flexible and friendly to use.

II. SURVEY

For the design and implementation of our project we have survey various journal papers and components. The whole project is application based which avoids wastage of liquids[1]. The filling and mixing is totally based on timer as the timing is given the valve will operate. In this project the SCADA is also used it just supervisory controllers the whole plant. [2]The working of whole plant is viewed on a control panel, but here the dc motor also being used which is used to mix the two liquids. This increases the assembly which may be a disadvantage of this project. The advantage of this project is that it avoids wastage of liquids. [3]The sensor senses the bottles and the assembly will start working of this assembly is same that explained earlier in two papers.

III. METHODOLOGY

As per the survey of different papers we have seen that filling method is same but filling the two liquids are different. In our project we have tried reduced the assembly. Now a days it is very important reduce the assembly in industries as this results it reduces human efforts. [1]The mixer is used for mixing the two liquids in the third tank is not being used in our project because when the two liquids

are coming from the two tanks are mixed automatically in third tank without any mixer. The gravitational force also plays an important role which pulls the liquid to the downward side. The bottles are put in a sequence on a conveyor. The sensor is used to sense the presence of bottles as the bottles are sensed by the sensor the mixing and filling procedure starts. As shown in figure1.

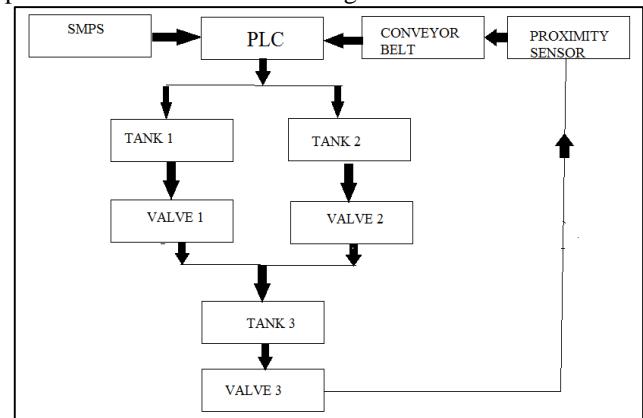


Fig. 1: Block diagram

Two liquids are used to be mixed to get the third liquid which is required to be filled into bottles.

Depending upon the size of the bottle we have put the liquid if the size of the bottle is not known then this will create wastage of liquid. For hardware reduction purpose we have not used any kind of level sensor. As if the size is known it is not needed. Valves are used at the end of two tanks having different liquids. The PLC will command to the valves for open and close purpose according to the program.

In the third tank two liquids are automatically mixed as discussed earlier at the end of the third tank third valve is placed which was operated by PLC.

As bottle is sensed by the sensor the conveyor will stop and empty bottle will come exactly near to the outlet of the third tank and liquid is filled into the present bottle.

IV. RESULT AND DISCUSSION

As per our research in this project we come to a result that the two liquids are mixed in an equal proportion. The quantity of the liquid is directly proportional to the size of the bottle in which liquid to be mixed. If the quantity is not fixed this will create wastage. The whole plant is controlled by the PLC which is having the program and we can make the changes as per the program. When the two different liquids are in two tanks and the valves which are located at the outlet of the two tanks will open for 5 seconds. These two liquids are come into third tank and mixed and the third valve which is used for the filling purpose it will open for 10 seconds.

We have seen that for filling one bottle we need 20 seconds. For filling 3 bottles we need 1 minute. In one hour

we will get 180 bottles filled. As the production rate increases.



Fig. 2: Two Different Liquids

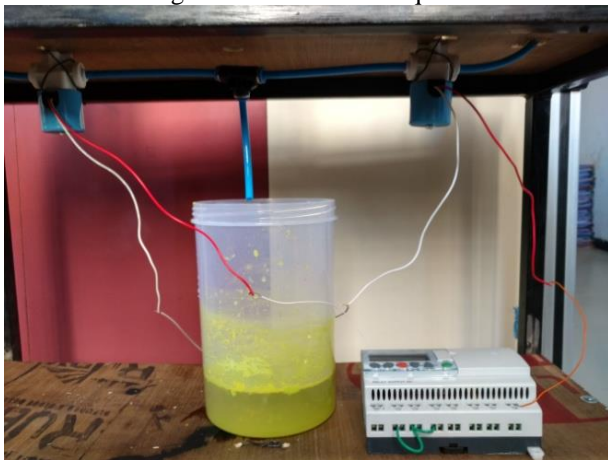


Fig. 3: Mixing of two liquids



Fig. 4: Filling of Liquids

V. CONCLUSION

The research on this project is a fully automatic and untouched liquid mixing and filling system. The least number of mechanism is required to produce high speed production in less time. This project also avoids wastage of liquids and mixing of two liquids in an equal proportion and having high accuracy. By changing programming and hardware we can mix n number of liquids. The PLC are costly but it having large number of features that overcomes the cost.

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