# AUTOMATED BOTTLE FILLING SYSTEM BY USING PLC

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ABSTRACT- As the production demand is increasing day by day so technology are being used in the manufacturing of a product, one of the most trending technology on which companies are relying on is automation of the whole system. This automation is done by using PLC and SCADA in which plc is the hardware and SCADA is software, both of these are the heart of automated system. Plc is used for controlling the outputs by changing the inputs and SCADA is used for analysing and monitoring of the system. This automated system is used because of the high accuracy and precision at lower cost.

## 1. INTRODUCTION-

As the name suggests this is the system in which the bottle is being filled by industrial automation through PLC and SCADA. This system is more advanced form of manual work and it also provide higher efficiency and the flexibility of the system is very high as the program can be changed in less time if the programmer wants to change the output then he can change the program according to the desired result. Assume if your company wants to increase the production rate in less time then this system would be a best fit for that company to get the profit. According to the literature survey i got to know about the diferntsytem level design for liquid filling.

## 2. Devices used in the system-

There are many things which are going to be used for making the desired system. These things are software which is basically SCADA and PLC for the programming of the system to get the desired output. And different types of sensors and actuators are used for getting different output at the same time. And one of the most important thing is AC Drive which is used to drive the motor on different speed.

2.1 PLC- PLC is referred to the name as "Programmable Logic Controller". PLC is the digital computer used for controlling the automation of an industry. PLC is available in different sizes as per variation of the no of inputs and outputs. PLC can be programmed through six different languages, but the most common language is Ladder Logic. PLC inputs are toggle Switch and Push button etc and the outputs of the plc are solenoid valve, motor etc. PLC's were developed in automobile sector to getting the flexibility and the accuracy in system. PLC's centre processing unit never get out of order.

2.2SCADA-

SCADA stands for "Sequential Control and Data Acquisition". SCADA is Software that is used for troubleshooting and controlling the whole Industry. SCADA has no memory storage so you can use hard disk for store this data. There is a requirement of the system drivers for the proper functioning of the SCADA.

2.3 SENSORS AND ACTUATORS-

These are many sensors are used in this type of system, some important sensors are Limit switch for calculating the amount of water filled in the bottle and one proximity sensor for the position of the bottle and infrared sensors analysing the size of the bottle.

2.4 AC DRIVE-

AC DRIVE is used for controlling the speed of the motor or you can say AC DRIVE is used for the multispeed control of motor. Ac drive is also used for the protection of the wiring of the plc for smooth operation. Programmer can change the direction of the motor without changing the wiring given to the plc.

3. SOFTWARE USED FOR DIFFERENT PLC'S-

| PLC Type | Software used |
| --- | --- |
| Bezier | E- designer |
| Allen Bradley | Panel builder |
| Siemens | Wincc flexible |
| Mitsubishi | GT- designer |

4. PROGRAMMING LANGUAGE-

There are six types of programming languages that can be used to program the PLC, but here we are using the Ladder Logic which is the common language among these six. In ladder logic the inputs, outputs and functions are used in a ladder sequence i.e. the step by step process lead to the execution of the program. This is the oldest programming language used for PLC. There are mainly two types of contacts in ladder logic, which are normally open and normally closed type switch.

5. Experimental work-

I had prepared a system and this system was totally based on the programming of PLC and the analysis was done on the ellipse SCADA. In this system I used Mitsubishi and Allen Bradley PLC and this system is totally automatic, before preparing the real time project I had done all the analysis through SCADA and then prepared a real time module and checked the functioning of the module and I got to know that the time taken by this system is 3 times lesser than the manual work. This was the system which was designed by me on SCADA-

6. SPECIFICATION OF THE BOTTLE FILLING SYSTEM-

Input to the plc- 24 volt Direct current.

Bottle height- 26cm

Diameter of the bottle - 8cm

Volume- 1 litre

Liquid- mixing of any two fluids.

Sensors- proximity sensor (for position), limit switch (for flow level calculation), Buzzer (for acknowledgement).

Stepper motor or the motion of the conveyer

7. RESULT- Through this system you can fill the 1 litre bottle which having 26cm height and 8cm diameter. This operation is fully automated and in the results we have compare the manual operation time and automated system time. After the comparison we get that the time consumption is more in the manual operation and the efficiency has increased in the automatic system. If constant production rate is there then the manual operation is better, but if there is any sudden change in production rate then the automatic system would be preferable.

| Operation performed | Manual | Automatic |
|---|---|---|
| Tank filling | 6.4 min | 3.6min |
| Mixing | 2.37min | 7sec |
| Conveyor on | 3.87min | 1min |
| Bottle filling | 1min | 7sec |

8. CONCLUSION-In conclusion, I just want to say that this system is very useful in case of sudden increment in production rate. This system consists of filling tank, mixing of the fluids, according to the programme everything is going to happen. This automatic system is different from another system because in this we used the buzzer for acknowledgement and this acknowledgement will help us to lower the cost and the better the performance of the system.

## 9. REFERENCES-

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