PLC Based Automatic Tablet Filling and Capping System using SCADA

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Abstract:
The objective of this paper is to design, develop and monitor “Tablet filling and capping using PLC with SCADA”. This project provides with a lot of benefits like low power consumption, low operational cost, less maintenance, accuracy etc. This project is a vast application used in number of industries like milk industries, chemical, food, mineral water and many industrial manufactures. Our paper aims at filling and capping bottles simultaneously. The filling and capping operation takes place at the same time but with some intervals. It also includes a user-defined number of tablets selection menu through which the user can input the desired number of tablets to be filled in the bottles. The entire system is much more flexible and time saving. Tablet filling is a task that is carried out by an automated machine. In this project, the filling of the bottles is controlled by using a controller known as PLC which is also the heart of the entire system.

Keywords: PLC, SCADA, Tablet Filling & Capping System, Automation

1. INTRODUCTION

The field of automation has had a notable impact in a wide range of industries beyond manufacturing. Automation is the use of control systems and information technologies to reduce the need for human work in the production of goods and services. Automation plays an increasingly important role in the world economy. Automation puts this continuity into consistent practice. Totally Integrated Automation covers the complete production line, from receipt of goods, the production process, filling and packaging, to shipment of goods. So by implementing the use of PLC’s in these processes, industries will initiate towards the era of new industrialization. PLC plays a very important role in the world of automation. It makes the whole process simple, flexible and accurate. A tablet filling system with PLC allows the user to fill the bottle till a desired level without wastage of the tablets. Ladder logic is used to control the sequence of the PLC. In addition to this, the use of SCADA has also been implemented for the monitoring of the entire system.

METHODOLOGY

Bottles are kept in position over a conveyor belt. They sensed the presence of those bottles. IR sensors are used for sensing the non-metallic bottles and inductive sensors for metallic bottles. Depending on the output of the sensor the corresponding containers will switch on and tablet filling operation takes place. In metallic bottles red tablet will be filled and in non-metallic bottles yellow tablets. If a particular bottle is not present then the container in that position is switched off, thereby avoiding wastage of the tablets. The filling operation is followed with a user-defined number selection menu which enables the user to choose the number of tablets to be filled. The filling process is done based on timing. Depending on the preset value of the timer the container is switched off for that particular period of time and the filling is done. After filling operation, the capping operation is done. One container puts a cap on every bottle and another will press it tightly for the convenience purpose.

Figure.1. Tablet filling and capping process
2. HARDWARE DESCRIPTION

1) PROGRAMMABLE LOGIC CONTROLLER
A programmable logic controller (PLC) is a digital computer used for the automation of various electrochemical processes. It is the Heart of the entire Automation System. We are using PLC because they are flexible, easy to program and space efficient.

2) SOLENOID VALVE
It is an electromagnetic valve which is used to control the flow of various types of liquids. By opening and closing the desired amount of liquid or no. of tablets is selected. It is very much efficient to use in the automation process.

3) SENSORS
In this project we have used Optical and Inductive sensors. Inductive sensors sense the metallic type bottles whereas optical sensors sense the non-metallic type bottles. These sensors play a vital role in automation type project.

4) DC MOTOR
The main use of the DC motor is for the Conveyor system. Conveyor Belt is used to make the different types bottles move forward followed by the DC Motor. The motor used in our project works on 12V DC supply. The speed of the motor is 10-12 RPM. In the mean time we can also control the speed of the motor.

3. SOFTWARE DESCRIPTION

In our Project we have used the “Indra Work Engineering” Software and Ladder Programming Language for controlling the entire system process. The PLC which we have used is “Bosch Rexroth” PLC which is one of the advance PLC which is been used in today’s date.

4. PERFORMANCE ANALYSIS

Automatic tablet filing and capping system must have low power consumption, low project cost, flexibility and high reliability. At the same time it should provide particular number of tablet to be filled in bottles for saving the operational time and cost. It should be capable to operate with continuous manner. The system should be flexible not only for different color tablets but also for the filling of different size of bottles. The system should be efficient to monitor the parameters such as temperature, tablet level, quantity, presence of bottle, speed of the system etc. The cost of the project should be 25% more efficient with respect to the proposed work. Time should be 1.5 second per bottle and speed of the system should be 40 bottles per minute.

5. CONCLUSION
The purpose of this project is to develop a PLC based tablets filling system plant. We gained much more knowledge about
various processes directly used in industries such as filling, capping etc. which are used in automation in which we specifically learnt about Programmable Logical Controller (PLC) and SCADA. 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. The main objective of this paper was to develop a Tablets filling and capping system based on certain specifications. This was successfully implemented.

6. REFERENCES

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