Automatic Capping And Sorting System Using PLC With SCADA

Veeranki Dileep Kumar[1], Prajapath Narpath Kumar[2], Palakaluri Sai Kiran[3],

Potturi H V N S Naveen[4], Akula K R Koteswara Rao[5]

[1234] *Student, Dept. Of Electronics and Communication Engineering, Vasireddy Venkatadri Institute Of Technology, Andhra Pradesh, India*

[5] *Engineer in Technical Service, DesignTech Systems Ltd, Hyderabad, Andhra Pradesh*

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Abstract – *Automatic capping and sorting is the process in which a machine does the capping of the bottle and sorts according to the color of the bottle which reduces the human intervention and increases accuracy. The entire system is controlled by using a PLC and monitored under Supervisory Control And Data Acquisition (SCADA). PLC is the core of the entire system and process. SCADA is used to supervise and control the execution from control room which is separated from the plant.*

Key Words: Programmable Logic Controllers **(**PLC), Supervisory Control And Data Acquisition (SCADA), Totally Integrated Automation (TIA), production line (conveyor) system, Pneumatic Cylinder (PC), color sensor (CS).
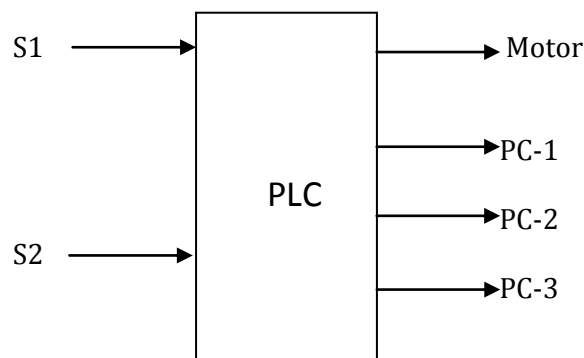
1. INTRODUCTION

Automation is a set of technologies that results in operation of machines and systems without significant human intervention and achieves performance superior to manual operation

A production line (production line (conveyor)) is used to move bottles from starting point to capping section and then to a sorting section.

Automatic capping of bottles is done by air controlled pneumatic cylinders. Sorting is also done by pneumatic cylinders with the help of a color sensor.

2. Design Process

Block Diagram

Fig-1 Block Diagram of Proposed System

1. When the start push button is activated, then the system comes to ready position. When sensor1 (S1) detects the bottle, the production line (conveyor) starts moving and goes forward.

2. After some delay from detection of bottle, the production line (conveyor) stops and PC-1 holds the bottle and then PC-2 activates and caps the bottle automatically.

3. When sensor2 (S2, color sensor) detects the bottle and if the bottle is of desired color, then PC-3 activates and sorts the bottle from the production line (conveyor).

S1 is a photo electric sensor used for object detection and an input to PLC. S2 is a color sensor which is used to detect the color of the object and an input to the PLC.

PC-1, PC-2, PC-3 are the pneumatic cylinders used to for capping, holding the bottle and sorting the bottle which are the outputs of the PLC.

DC motor is the output of the PLC and is used to run the conveyor system.

This system can be seen in flow chart as follows:
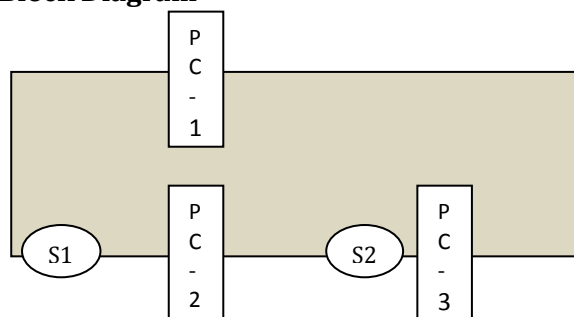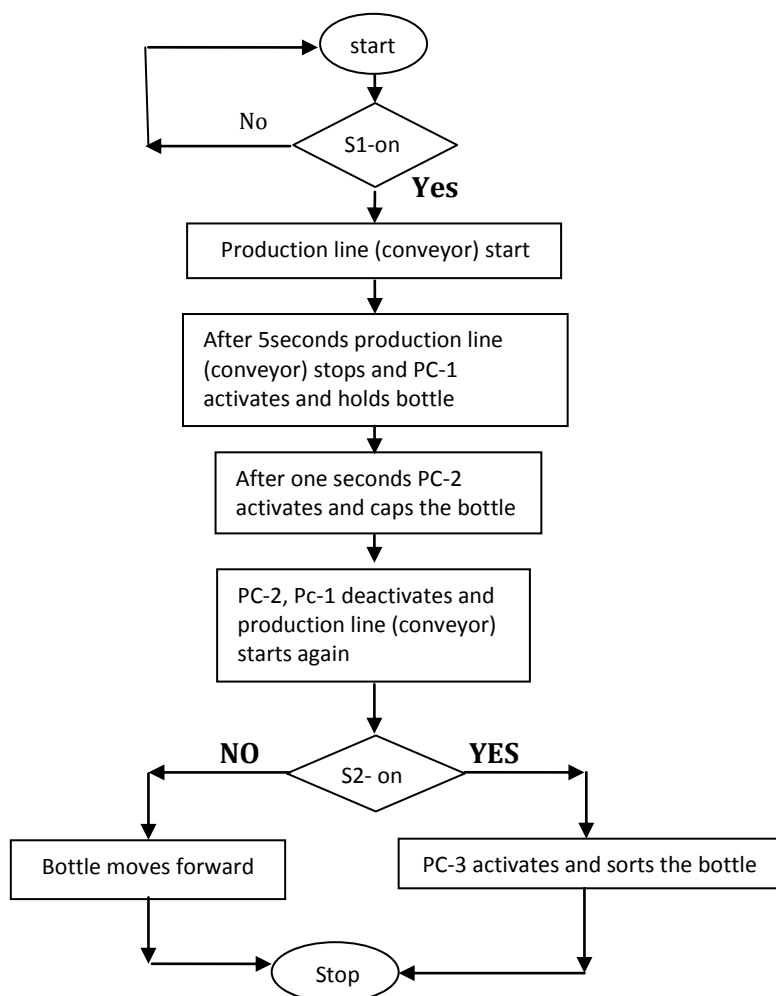

Fig3.1 Production line (conveyor) system

4. Results
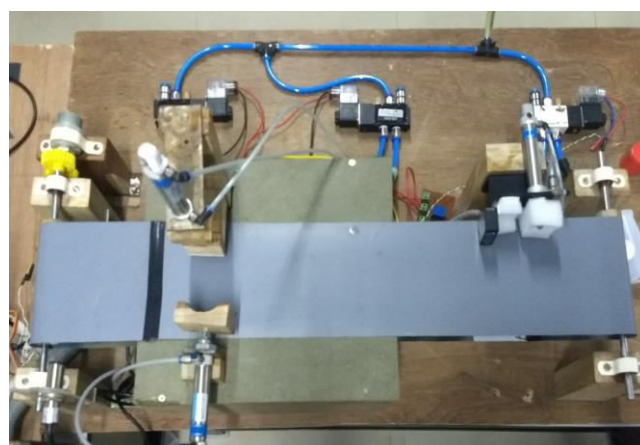
Fig-2 Top View of the Arrangement

Fig-3 Front View of the Arrangement

3. Experimental Details

To run the production line (conveyor) a DC motor is used with high torque and less speed. A photo electric sensor is used to detect the bottle.

Air controlled pneumatic cylinders are used for holding bottle, capping and sorting the bottles. Directional Control Valve (DCV) is used to control the directions of the pneumatic cylinders. PLC programming is done in ladder logic using TIA portal.
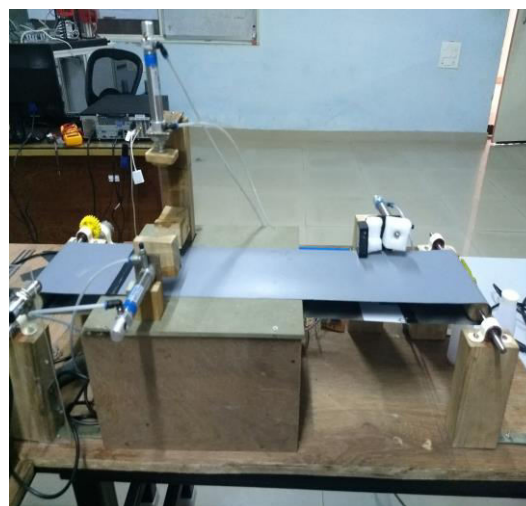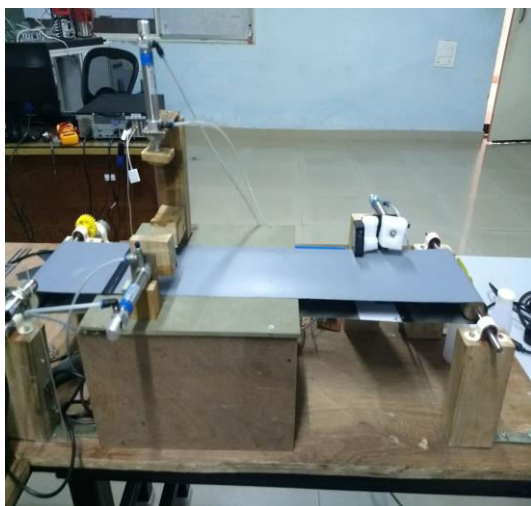
Fig-4 Overall Arrangement

5.   Conclusions And Future Scope

Automatic capping and sorting is done using PLC with less human intervention and more accuracy. Monitoring of whole process is done using SCADA, which is a graphical interface.

This system can be extended to automatically sort different based on size, color, material, height etc can be done with reduced human intervention and more accuracy.

This system can be extended by implementing rotatory motion which fasters the capping process.

This system can also be extended to count the number of bottles sorted based on color, size, height, material etc.

6.   References

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