AUTOMATED TRANSPORTAION SYSTEM FOR MULTI-FLOOR   PACKAGING INDUSTRY

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ABSTARCT

In this paper we consider the limitations of multi-floor packaging industry where the main problem is to transport heavy weight boxes from one floor to another floor accurately and safely for labelling or testing. For this process they require large number of labours. We provided new solution for this problem using automated conveyer system with chain socket mechanism lift, sensors and plc based controller to reduce labour costs, improve safety in high precision delivery so that it will help to boost the efficiency in the transportation of manufactured products in packaging industry.

Keywords: Automation, Lift Mechanism, Programmable Logic Controller (plc)

I. INTRODUCTION

Mainly in packaging industry the problem is to transport heavy weight box packages from one floor to another floor so it requires more labours and times to achieve the goal. Sometimes mishap occurs in the form of physical and mental injury of labours due to heavy weight boxes transportation continuously from one place to another place. Previously solutions are provided to this problem with micro-controller but low precision and constrain of high voltage usage limits its application. A plc has the potential application in industry as it can overcome the above mentioned limitations. In this paper we have come up with a new proposal to fully automate the packaging industry with the help of different sensors, lift with load measuring capability and programmable logic controller. Different industrial aspects were discussed: sensors, actuators, controller and mechanical designs. Fig.1 elucidates actual model of our proposed transportation system.
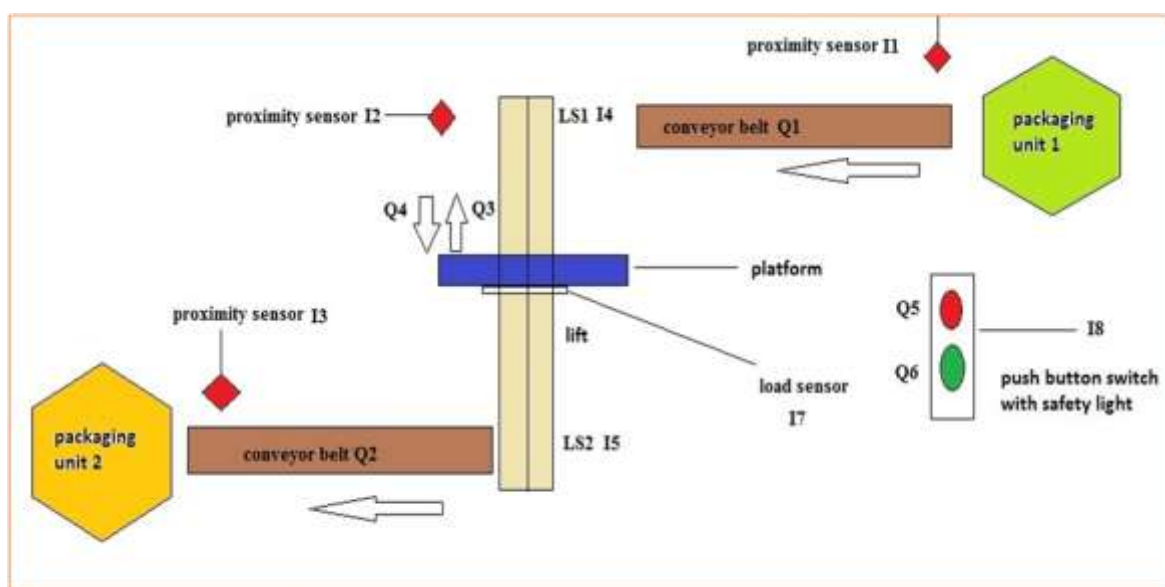

Figure 1: Actual Model

II. TECHNICAL APPROACH

In fully automated packaging industry requires lift with sensors like load sensor and proximity sensor for measurement of load, and presence and count of boxes respectively. Based on sensors data the lift movement will achieved. In this work we incorporated counter to measure the number of boxes as lift will be actuated only after maximum number of boxes will be reached up to five. Again if sometimes this counter starts malfunctioning another sensor which is load sensor is present to detect the load. If the maximum load is over 1 kg it will automatically starts the lift to move down and red light along with alarm will be set. A chain mechanism with cam follower inside is used for the movement of lift and replacing packages from lift to the exit conveyor respectively.

The sensor used for our FASMPI (Fully Automated System for multi floor Packaging Industry) system includes load sensor, proximity sensors and limit switches. Load sensor mainly use for detection of box weight. Proximity sensors are used for different purpose such as detection of boxes on the lift platform and in conveyor, and for counting number of boxes on platform. Two limit switches has been used to limit the movement so that the lift will stop at predefined position. After analyzing all the data obtained from the above mentioned sensor, a controller which is plc here will take decision whether the lift will start or stop.

A high torque d.c motor is used for the motion of both the conveyor and the lift. To replace conventional microcontroller, a plc is used as a controller to interface sensor and actuator. The number of I/O is mentioned in algorithm depicted in Fig.3

III. ALGORTHAM

Figure 2: Schematic Diagram

Fig.2 shows the block diagram of proposed model. Respective address used in plc programming has shown in this figure. Work flow illustrated in Fig.3.
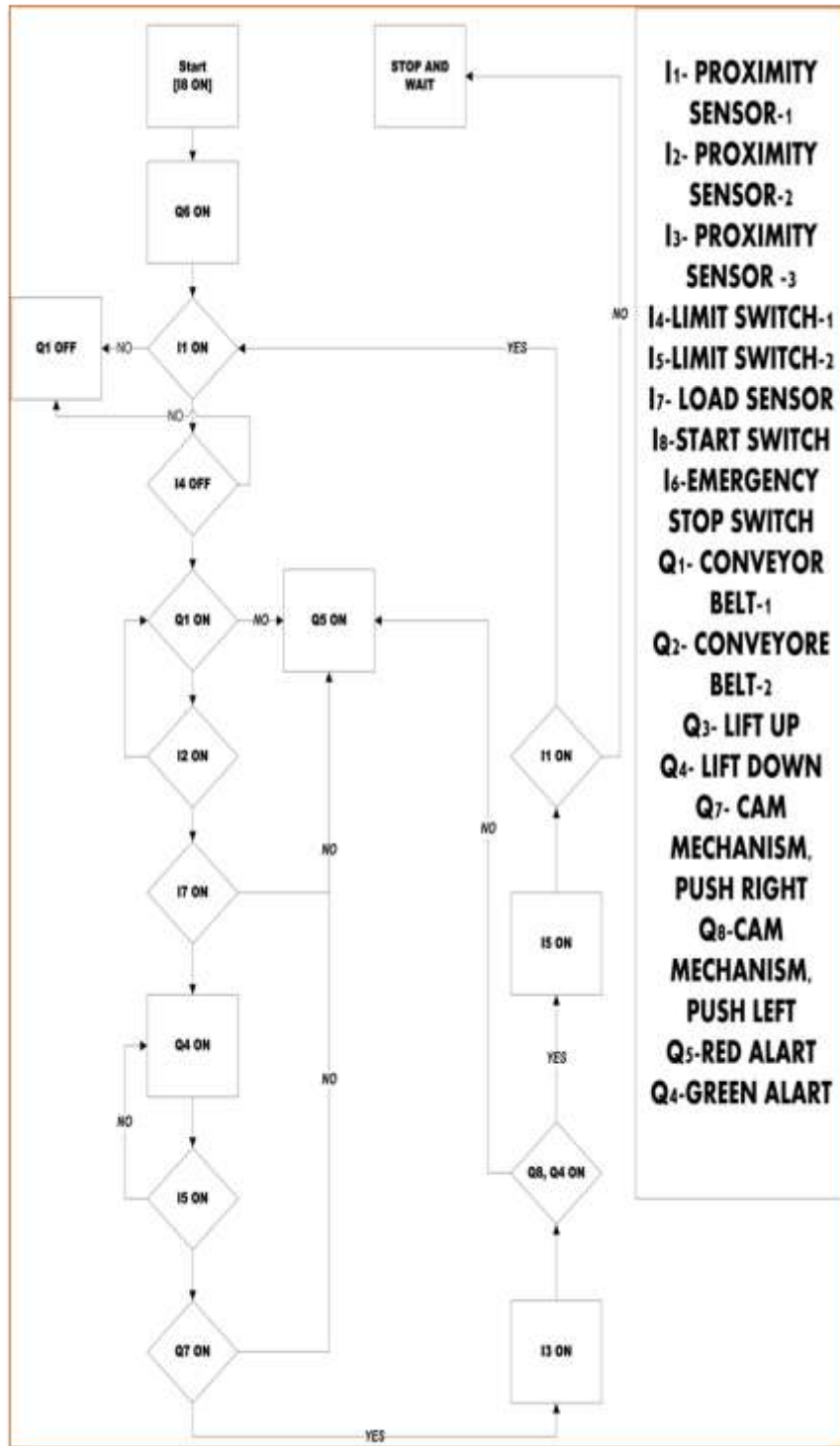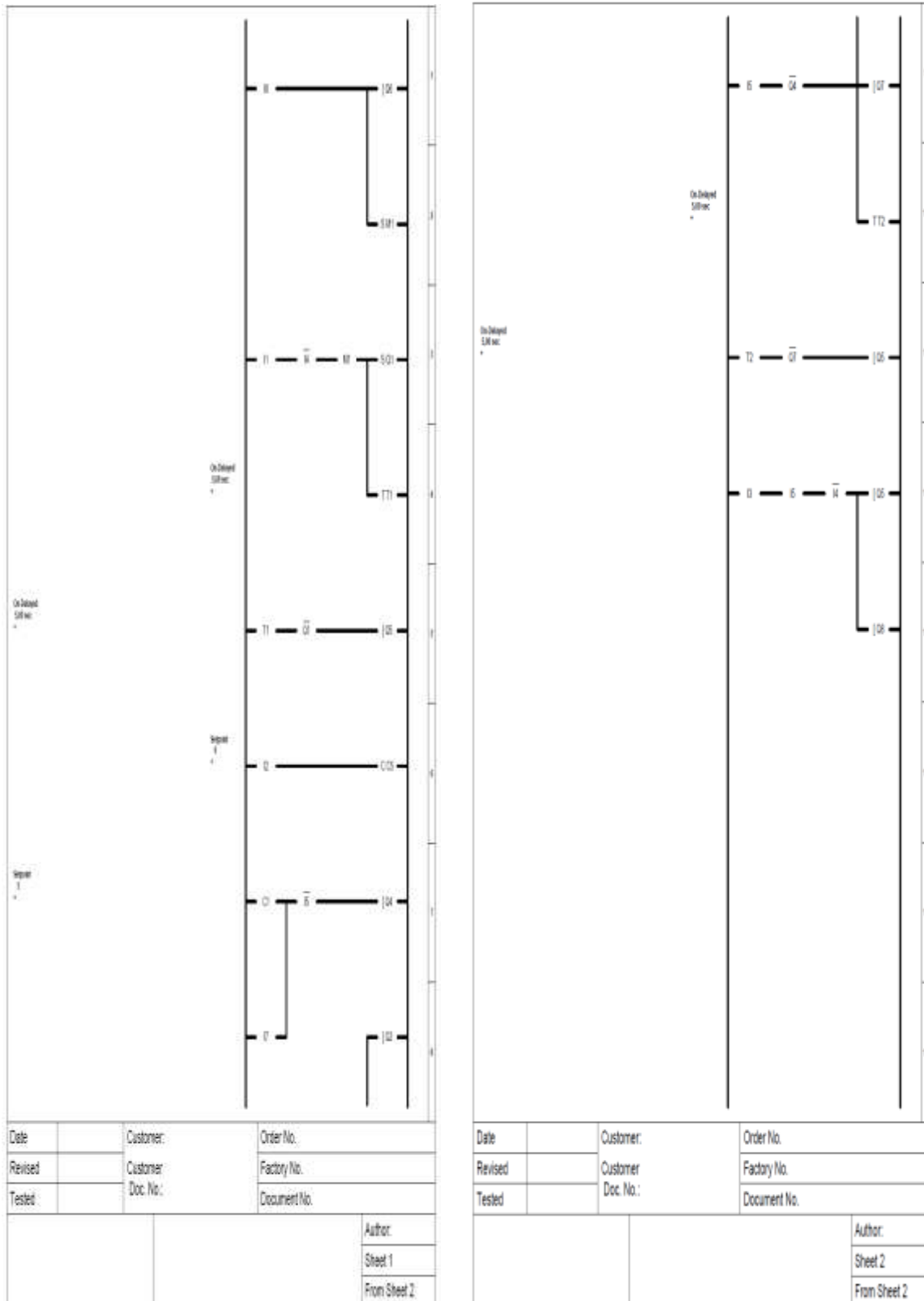
Figure 3: Algorithm

Figure 4: Ladar Logic

III. CONCLUSION

We have successfully run the algorithm with hardware and it works successfully. From this work we can conclude that

- Microcontroller is a low cost special purpose device. It can handle low power application. But for industrial application plc has the potential to compete with other controller including microcontroller.
- Automation is always advantageous than manual work. The design we proposed for heavy load transportation is more efficient and cost effective.
- Proximity sensors are well available in market. Not only that, it has shown better accuracy and repeatability than that of a IR-TSOP based configuration.
- In normal heavy transportation industry, hydraulic mechanisms are used but chain based cam followers are simple and cost effective.

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