International Research Journal of Engineering and Technology (IRJET) e-ISSN: 2395-0056
Volume: 07 Issue: 10 | Oct 2020 www.irjet.net p-ISSN: 2395-0072

# DEVELOPMENT OF PLC BASED AUTOMATIC POWDERING AND PACKAGING SYSTEM

**M.Naveenkumar[1], R.Latha[2]**

*[1]Student, Department of Electrical & Electronics Engineering, PSG College of Technology, Coimbatore.*
*[2]Associate Professor, Department of Electrical & Electronics Engineering, PSG College of technology, Coimbatore.*

---

**Abstract -** *Now a days, Programmable Logic Controller (PLC) is widely used in applications of digital world which is applied at the industrial sector. The modern PLC's are used in color mixing plant, milk industries, chemicals, foods, mineral water and many more manufacturing, processing and packaging industries. This project is to deals with development of automatic powdering of almond and packaging system using PLC. Traditional method of grinding of almonds and mixing of different types of colors in almond powder and packaging involve manual repetitive tasks. Manual handling of such powdering process is time consuming; expensive and often lack consistency in product quality due to human errors. Hence PLC can be used to automate the powdering process, to reduce the complexity of the process. In this PLC based automated powdering system, ladder logic is developed to simulate the process such as the grinding of almonds, mixing with different ingredients in predefined proportion and cooling at different temperature. This PLCs automatic system makes use of limiting sensor, colour sensor, temperature and proximity sensors for segregation of process depending on the instructions specified in the ladder logic in PLC. The PLC used in this system is a Siemens S7 – 200 which makes the system more flexible and easy to operate.*

***Key Words***: **Siemens PLC S7-200, Ladder Logic, Automatic control…**

## 1. INTRODUCTION

In all industries PLC is particularly used for automation purpose which facilitates in reducing packaging time and will increase the production fee in comparison with guide device. The received electrical sign is passed to PLC gadget which incorporates the ladder diagram of the circuit which holds the specified instructions of the machine in internal storage. Computerized segregation and directing of substances is controlled using PLC. It uses proscribing sensor, color sensor, proximity sensors for segregation and directing of the materials is controlled by using the use of motor and the conveyer belt relying on the instructions targeted inside the ladder logic in percent. This paper affords a take a look at by way of simulation and experimental fashions for three kinds of applications of PLC. The packages suggested are computerized mixing and bottle filling, computerized counting and packing and automatic sorting. A particular commercial percent and associated software program, has been hired for the paintings supplied. The verification of the good judgment is performed the use of Ladder diagram and primarily based on this good judgment hardware has been applied. Typically there are five lessons of PLC micro small, medium and big. The standards utilized in categorizing percent includes capability no of inputs and outputs cost and physical length.

## 2. BLOCK DIAGRAM

The significant processing unit, on the other hand, is where the PLC shops all of its data and does all of its laptop processing. Every of the components of a percent has specific functions. Input/output gadget. The enter/output system is made from additives, the enter interface and the output interface.

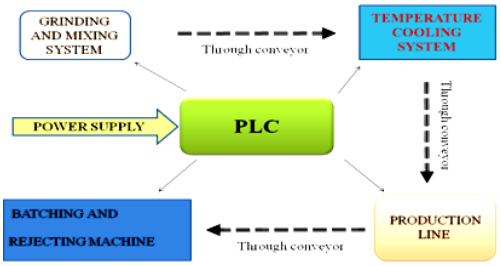


**Fig -1**: Block diagram

It has four stages of operation are

- Grinding and mixing system
- Temperature control system
- Production line
- Batching and rejecting machine

### 2.1 Grinding and Mixing system

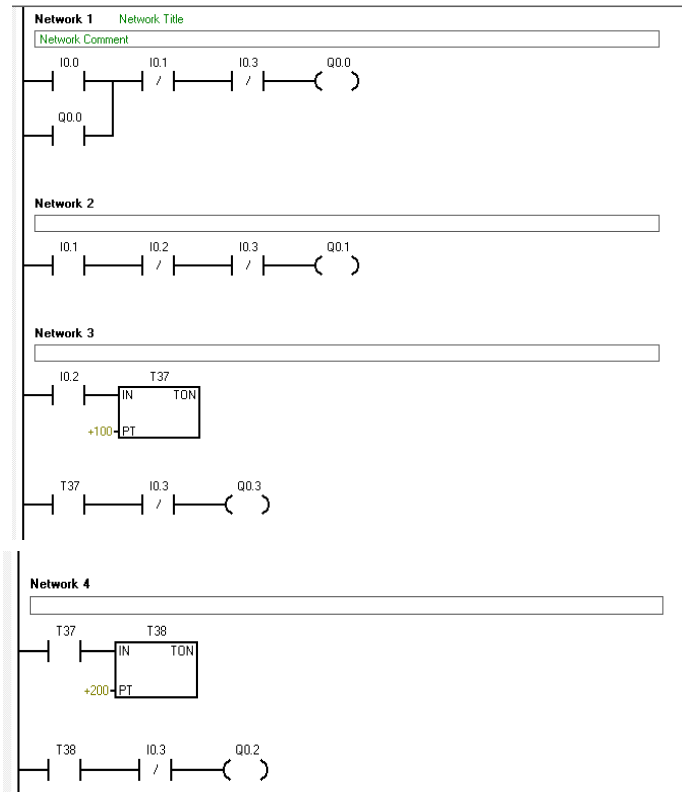


**Fig -2.1:** Ladder diagram of Grinding and Mixing system

The Process starts when a containers come across empty Ref Fig 2.1 the sensor X1 is on. X1 Sensor is sensed then Y0 &Y1 is on simultaneously.Y1 inlet valve is start for 5sec by using timer sensor and its closed. After completed this part sensor X2 is on if it reach its level then Y0 is closed. After the two ingredients filled in a container its move a mixing process. Blender comes down to mix the ingredients by 10sec, the system shown in Fig 2.1. After completion of this process solenoid valve Y3 is opened. If it reaches the X1 lower level sensor the process starts continuously.

### 2.2 Temperature control system

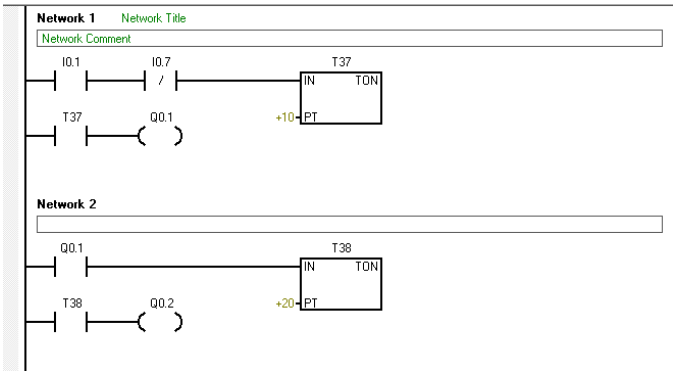


**Fig -2.2:** Ladder diagram of Temperature control system

In temperature Control system shown in Fig 2.2 the powder reaches the sensor I0.1 and its starts to cool the powder at 1st degree and also T37 Timer Starts for 10s after Conveyor Q0.1 is turned on and its move to Second degree process by 20s after this completion process conveyor move to third stage degree process by 30s..Finally powder will be cooled and its move to production line.

### 2.3 Production line

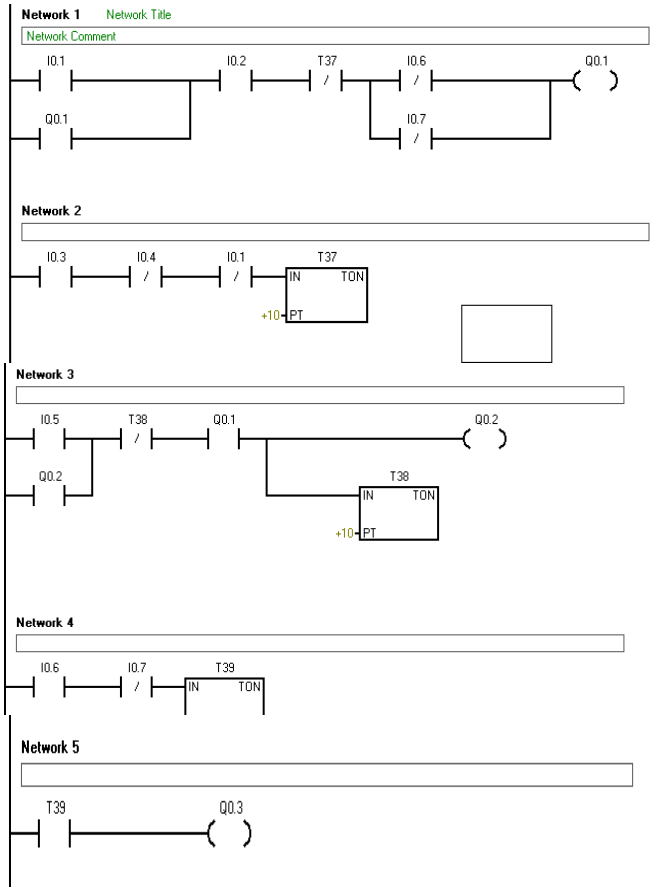


**Fig -2.3:** Ladder diagram of Production line

Photo electric transfer is used to depend three cans into the palletizing device that transports 3 cans through a system which heat shrinks a plastic wrapping over them. All photoelectric switches on the manufacturing line are of the unfashionable reflective kind.

### 2.4 Batching and rejecting machine

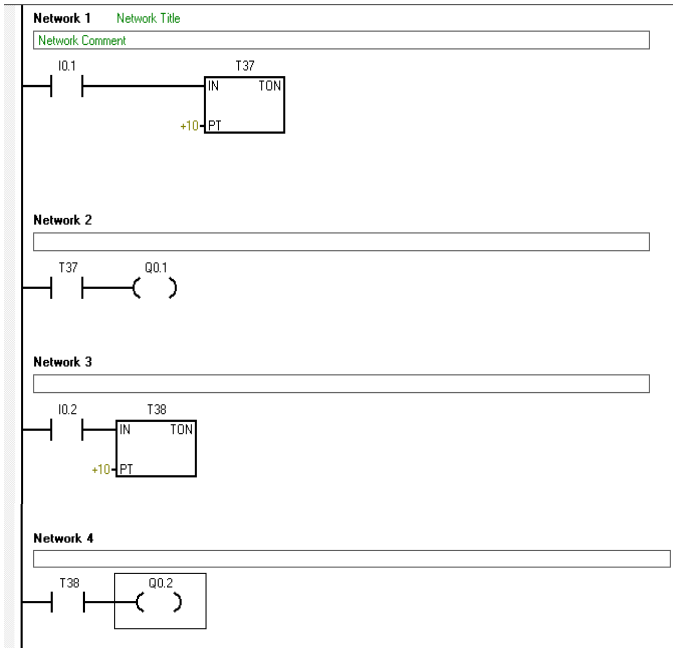


**Fig -2.4:** Ladder diagram of Batching and rejecting machine

The PLC venture is to stumble on and reject defective additives. Components are transported on a conveyor beyond a unfashionable-reflective type photoelectric switch, The Fig.2.4 shows ladder diagram of Batching and Rejecting machine system. The photoelectric transfer is located at a top (H) above the conveyor where (H) represents a tolerance fee for element peak. Excellent additives bypass beneath the photoelectric transfer and no signal is generated. Defective additives ruin the light beam twice as they pass the photoelectric transfer. The Table.1 shows the some examples of input and output connected devices and their address can be defined.

**Table -1:** Example of I/O Address

| Input Listing | Address | output Listing | Address |
|---|---|---|---|
| Inductive sensor | X0 | Pilot light | Y0 |
| Reed sensor | X1 | Motor | Y1 |
| Capacitive sensor | X2 | Solenoid valve | Y2 |
| Push button | | X3 | |

### 3. CONCLUSIONS

**C**onsidering the fact that remaining three decades Programmable logic Controller (PLC) is notably used in industries for controlling series of procedures in industries when you consider that remaining decades. The PLC programming gear are constantly growing, so it is able to be used greater extensively inside the applications of numerical manage era, control of machining center. By using automatic characteristic of percent, productiveness is multiplied through simple ladder logic and also reprogramming can be executed.

PLC based almond powdering and mixing gadget is simulated on PLC Siemens S7–200 with Ladder logic. The proposed work describes computerized PLC primarily based machine consists of restricting sensor, color sensor, temperature and proximity sensors for segregation of process depending at the commands particular in the ladder common sense. PLC may be used to

automate the powdering process, to reduce the time-ingesting and decrease complexity of the manual technique. In this undertaking ladder common sense is developed and simulated for the entire process which includes the grinding of almonds and combining with unique ingredients at one-of-a-kind temperature degrees. This task affords most reasonably-priced and efficient answer for packing of almond powder. It could also be concluded that the price of proposed system would be less expensive.

**REFERENCES**

[1] P. Birmole, M. Kamble, S. Naik, A. Sadamate and H. V. Korgaonkar, "Designing and Implementation of Chemical Mixing and Filling Bottles Using PLC," Second International Conference on Inventive Communication and Computational Technologies (ICICCT*)*, Coimbatore, pp. 436-439, 2018.

[2] M. Sreejeth and S. Chouhan, "PLC based automated liquid mixing and bottle filling system," IEEE 1st International Conference on Power Electronics, Intelligent Control and Energy Systems (ICPEICES), Delhi, pp. 1-5, 2016.

[3] S. Pai, N. Bansal, K. Desai, A. Doshi, D. Moharkar and M. Pathare, "Intelligent PLC based transformer cooling control system," International Conference on Nascent Technologies in Engineering (ICNTE), Navi Mumbai, pp. 1-6, 2017.

[4] U. Sanver, E. Yavuz, C. Eyupoglu and T. Uzun, "Design and implementation of a programmable logic controller using PIC18F4580," IEEE Conference of Russian Young Researchers in Electrical and Electronic Engineering (EIConRus), Moscow, pp. 231-235, 2018.

[5] F. Durrani, M. Riaz, M. H. Ahmad, S. Durrani and H. Ali, "SCADA & PLC based fully automated pneumatic cutting machine: A test bench for industry and laboratory," International Conference on Engineering and Emerging Technologies (ICEET), Lahore, pp. 1-6. 2018.

[6] Archana and B. Yadav, "PLC & SCADA based automation of filter house, a section of Water Treatment Plant," 1st International Conference on Emerging Technology Trends in Electronics, Communication & Networking, Gujarat, , pp. 1-6, 2012.

[7] Sheng Qiang, X. Z. Gao and Xianyi Zhuang, "PLC-based control systems for industrial production of fuel alcohol," IEEE International Conference on Industrial Technology, IEEE ICIT '02., Bankok, Thailand, pp. 827-832 vol.2, 2002.

[8] R. Coupat, A. Philippot, M. Niang, C. Courtois, D. Annebicque and B. Riera, "Methodology for Railway Automation Study and Automatic Generation of PLC Programs," in IEEE Intelligent Transportation Systems Magazine, vol. 10, no. 3, pp. 80-93, 2018.

[9] L. Luo and B. Liu, "Research on PLC-Based Control System for Mixing," International Conference on E-Product E-Service and E-Entertainment, Henan, pp. 1-3, 2010.

[10] Zhihuai Xiao, Tianfu Cai, Yiwen Zhang, Zhao Liu and Weiping Peng, "The automatic control system based on PLC in concrete's grouting and vibrating project," Second International Conference on Mechanic Automation and Control Engineering, Hohhot, pp. 5358-5361, 2011.