

# PLC PROGRAM FOR FOOD PROCESSING INDUSTRY

EE-431 Industrial Electronics

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## I. Abstract

The food processing plant has adopted the concept of automation. Utilizing PLC. The objective is to detect burned chips and remove them by using PLC so the project is to convert the manual project into fully automated plant for achieving higher accuracy & high hygiene, and to save time and raw material. Automated plants also help to increase the quality of products. The system uses intelligent equipment on site which deliver physical parameters (Analog/Digital) to PLC for easy monitoring of plant.

## II. Introduction

Automation is not a newer concept. Automation is the use of machines, control systems and information technologies to optimize productivity in the production of goods and delivery of services. A Programmable Logic Controller, PLC is a digital computer used for automation of electromechanical processes, such as control of machinery on factory assembly lines, amusement rides, or light fixtures. Simplification of engineering and precise control of manufacturing process can result in significant cost savings.



*Figure 1: PLC*

## III. Problem Description

Potato chips are made in company and send to final packing. As per the process we need to identify the chips because in chips some chips might be burned. Burned chips should be removed from the conveyor. Make PLC program for the application which can detect burned chips and remove them.

## IV. Problem Diagram

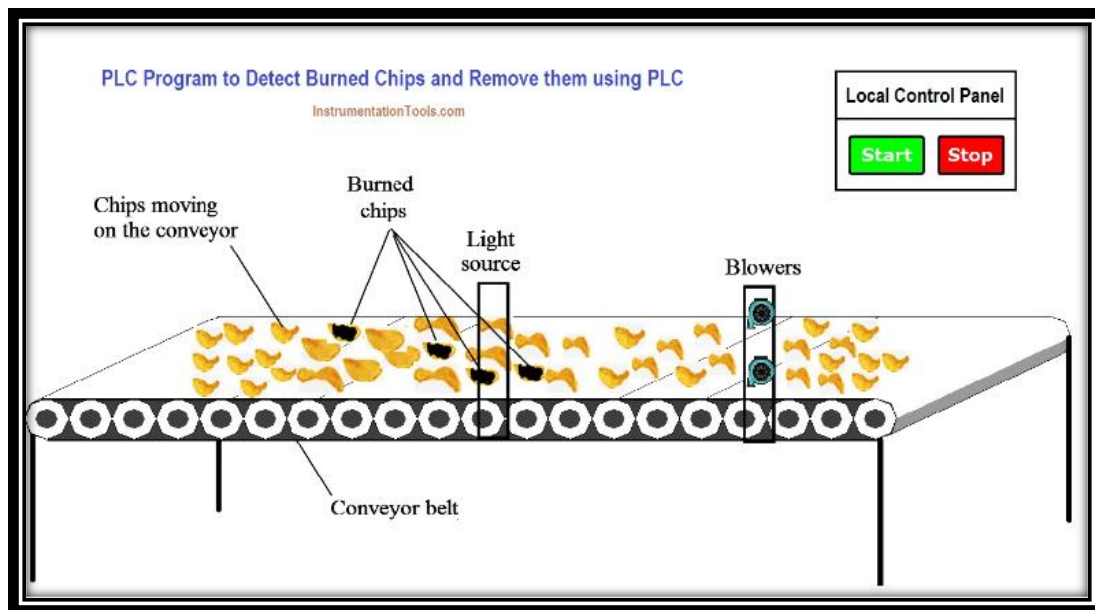


Figure 2: Problem Diagram of Burnt Chips Error

## V. Problem Solution

- To detect burned chips a light sensor are used. Light dependent resistors (LDR) are used to detect the burned chips.
- Blowers are used to throw away the burned chips from the conveyor whenever burned chips are detected.
- Blowers are used to throw away burned chips from the conveyor. Here we used two blowers, the number of blowers depend on the size of the conveyor.
- Time measurement is necessary for blower cycle. Here we measure the time taken by chips to reach from light source to blower.

Here we consider simple application for detecting burned chips on the conveyor and remove them. We have taken here light source to detect burned chips on the bases of darkness of the chips.

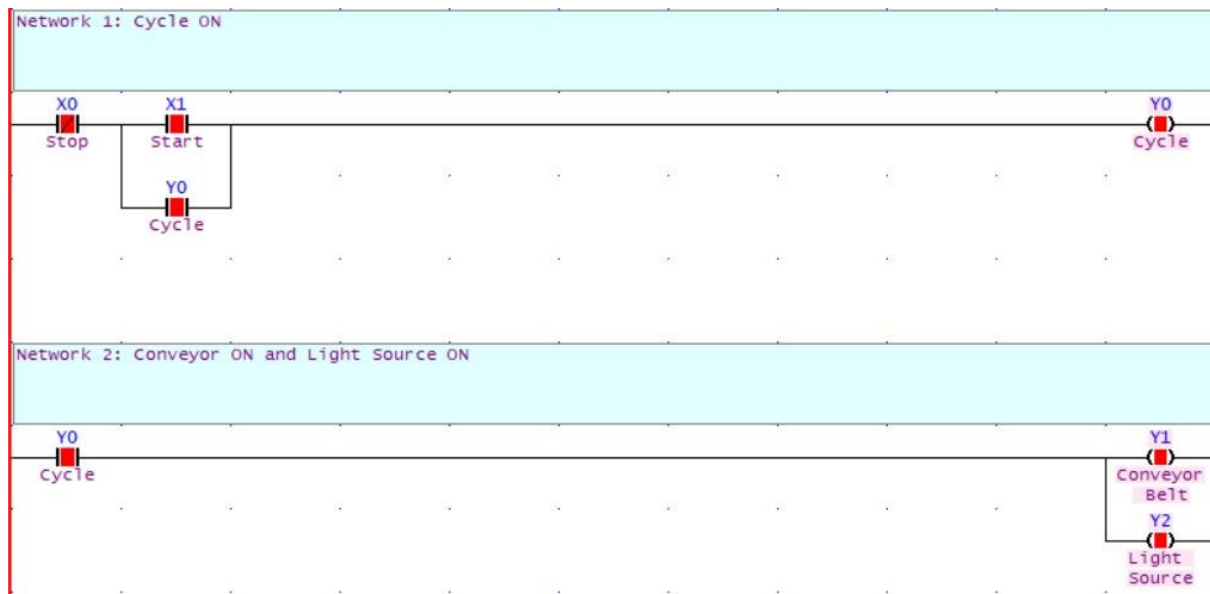
## VI. Input and Outputs

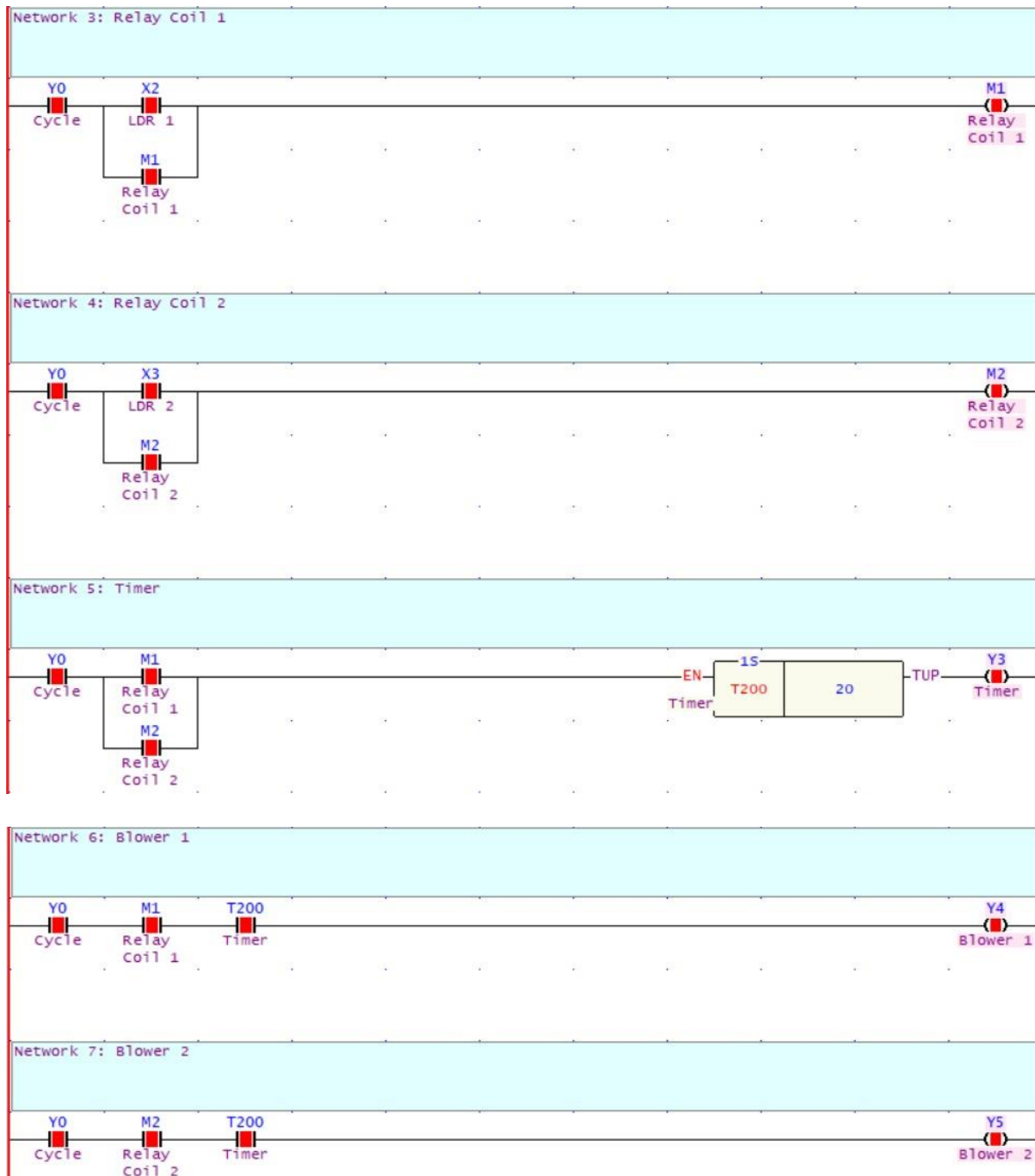
The networks elements used in the ladder logic has been described below:

Network Element	Address	Description
Stop Push Button	X0	Push Button
Start Push Button	X1	Push Button
Cycle	Y0	LED
Conveyor Belt	Y1	LED
Light Source	Y2	LED
LDR 1	X2	Push Button
LDR 2	X3	Push Button
Relay Coil 1	M1	Memory Coil
Relay Coil 2	M2	Memory Coil
Timer	T200	Timer
Timer Indication	Y3	LED
Blower 1	Y4	LED
Blower 2	Y5	LED

Table 1: I/Os Description

## VII. Ladder Diagram





## VIII. Program Description

For this application we use FBs-24MA PLC and WIN PRO LADDER portal software for programming. We can implement this logic by using other PLC also.

### Network 1:

In first network we used latching circuit for cycle ON (Y0), here we used START PB (X1) to start the cycle and STOP PB (X0) to stop the cycle.

### **Network 2:**

When cycle is ON (Y0), conveyor (Y1) and light source (Y2) will be ON.

### **Network 3:**

Cycle is ON and LDR 1 (X2) is detected, relay coil 1 (M1) will be ON.

### **Network 4:**

Cycle is ON and LDR 2 (X3) is detected, relay coil 2 (M2) will be ON.

### **Network 5:**

Either relay coil 1 (M1) or relay coil 2 (M2) is ON timer instruction will be executed, during this operation cycle is ON.

### **Network 6:**

When cycle is ON (Y0) and timer output (Y3) is ON, blower 1 (Y4) will be ON.

### **Network 7:**

When cycle is ON (Y0) and timer output (Y3) is ON, blower 2 (Y5) will be ON.

When LDR sensors detect burned chips on the conveyor, blower's timer (20s) will be ON and it will throw away the burned chips from the conveyor. Here we assumed 20s travelling time taken by chips to reach from light source to blowers.

Number of blowers is depended on the size of the conveyor.

## **I. Conclusion and Future Work**

In the industry, the execution of automation is a difficult task for which a proper monitoring and management system is required. Considering the production of chips, the burnt chips problem that is most common has been resolved by implementing the concepts of FATEK PLC learnt previously to overcome the problem.

## **II. References**

<https://instrumentationtools.com/plc-program-for-food-processing-industry/>