Monitoring the Time of an Event Using PLC

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Abstract- **In recent years there is a considerable growth and development in the field of automation both in industry and residential areas. The production rates of industries have considerably increased in recent years leading to the shortage of labors. Industries generally manufacture same type of products with little variation in size, colour, weight and shape. Here sorting of defective object plays an important role as these industries cannot afford any human errors for sorting products. Thus, it becomes absolutely necessary to develop a system that could sort these objects without any human interference & in accurate manner. Automation industries focuses on developing automation having long durability, low cost, less maintenance, and to make system as user friendly as possible. Thus, we have developed a system for sorting object with any metallic impurities using sensor and motor controlled by Programmable Logic Controller (PLC) and the conveyor in the system passes the object through sensors and hence by monitoring the time we can control the process .**

Index terms- Automation, PLC, timers, counters

I. INTRODUCTION

The new development in manufacturing industry is greatly dependent upon research in the manufacturing sector and innovation in new products. The countries having high rate of production and quality are marked as developed whereas those countries with low production rates are underdeveloped [2].

During processing, the raw material gets transformed into product. Once this product gets processed it earns a value for sale. Therefore, manufacturing is „adding value" to the material. The value that is earned by the product should have more cost allowing the organization to make money out of it [1].Industries generally manufacture same type of products with little variation in size, colour, weight and shape hence sorting plays an important role. In earlier days when demand was less it was possible to use manual labor for sorting similar object, but now with increase in demand and production industries can't afford human errors for sorting these products. This scenario forced the industries to adopt automation of the sorting and packing process. Proper storing of finished goods is also important for the industry. Boxes are stacked in the warehouses and this process also requires large amount of labours, automation in this area helps to ease the process. In developing any industry economy is the main factor that is considered, hence it is necessary to make cost effective automation system which is affordable [2]. Also, system should be able to enhance productivity and remove defective object accurately is necessary. The stacking should be done properly without any failure.

In this project, we have developed a cost-effective automation system for sorting lightweight objects for any metallic impurity. The projects main focus is on the removal of impure objects and stacking of the boxes in the stand. This whole process is done automatically with the help of PLC[4]. DC motor is used for pushing the object form the conveyor belt into the recycling bin. The system consists of two conveyor belts for taking object and boxes, and the stacking mechanism consisting of lift and the stand for placing boxes. Conveyor belt brings the objects near the sensor and hence logic for PLC is decided. The PLC is programmed for sorting, counting and stacking of the objects. The system consists of four IR sensors for signalling the PLC and detect the presence of object and boxes. Counting of object is also done with the help of this sensor. The metallic defect is detected with the help of proximity sensor. In our project, we have used two conveyors, product conveyor and box conveyor [5]. We have focused on developing product conveyor and stacking model. Whole system uses DC motors for powering. These motors are interfaced with the PLC through relay cards. Sensors are placed on the metal plates and proximity sensor is hanged from above. One sensor is mounted on the placing mechanism of the stacker lift.

This sensor will detect the presence of the boxes that were already kept there.

II.CONTROL PROCESS REQUIRED

Figure.1 illustrates a timer-counter program that produces a time-of-day clock measuring time in hours and minutes. The operation of the program can be summarized as follows:
An RTO timer instruction (T4:0) is programmed first with a preset value of 60 seconds.

- The T4:0 timer times for a 60-second period, after which its done bit is set.
- This, in turn, causes the up-counter (C5:0) of rung 001 to increment 1 count.
- On the next processor scan, the timer is reset and begins timing again.
- The C5:0 counter is preset to 60 counts, and each time the timer completes its time-delay period, its count is incremented.
- When the C5:0 counter reaches its preset value of 60, its done bit is set.
- This, in turn, causes the up-counter (C5:1) of rung 002, which is preset for 24 counts, to increment 1 count.
- Whenever the C5:1 counter reaches its preset value of 24, its done bit is set to reset itself.
- The time of day is generated by examining the current, or accumulated, count or time for each counter and the timer.
- Counter C5:1 indicates the hour of the day in 24-h military format, while the current minutes are represented by the accumulated count value of counter C5:0.
- The timer displays the seconds of a minute as its current, or accumulated, time value.
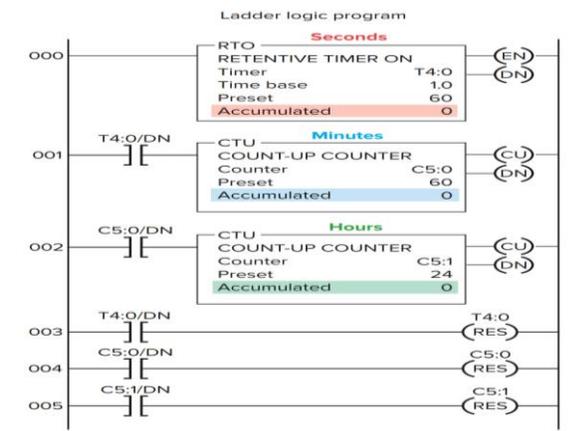
Figure.1:24-hour clock program

The 24-hour clock can be used to record the time of an event. Figure.2 illustrates the principle of this technique. In this application the time of the opening of a pressure switch is to be recorded. The operation of the program can be summarized as follows:
The circuit is set into operation by pressing the reset button and setting the clock for time of day.
This starts the 24-hour clock and switches the set indicating light on.
Should the pressure switch open at any time, the clock will automatically stop and the trip indicating light will switch on.
The clock can then be read to determine the time of opening of the pressure switch.

III. LADDER DIAGRAM
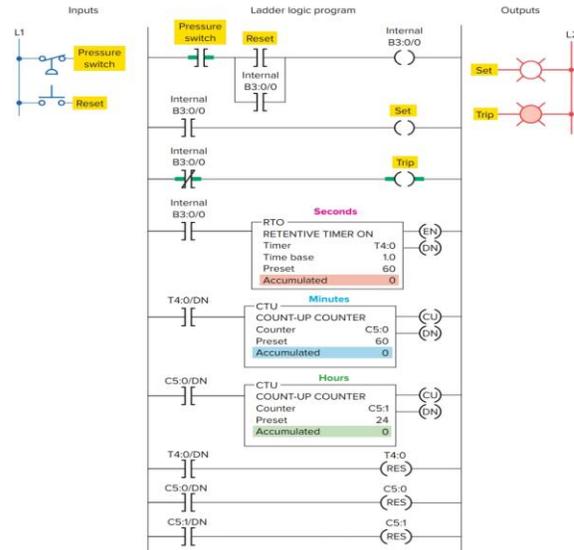
Figure.2 Monitoring the time of an event

IV.CONCLUSION

In the systems when the technology was not reliable to make processes completely automatic as they had many problems and failure, due to this drawback human intervention was required at every stage in the manufacturing process in the industry. This resulted in the time and production loss due to human and machine errors. But as the development in the technology took place sophisticated instruments and sensor are being used to reduce human interference and increase efficiency. In , we have built the system which can identify defective object count number of

objects and time and we can turn on/off automatically at required time. Whole process is automated and only one operator is required to monitor the process. This system automated using PLC and sensors.

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