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PLC Based Industrial Timer Controller

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ABSTRACT: This paper focuses on PLC based industrial timer controller. PLCs were designed as a replacement for hard-wired relay and timer logic control systems. we are implementing this timer controller system in industrial ovens. Thus, the oven temperature is regularly monitored and lead to a constant as required by the research plant. This system is monitored using Human Machine Interface (HMI) screen which is connected to the PLC by means of communication cable. The result of this paper is to control time in industrial oven using PLC.

KEYWORDS: PLC, Timer Control, Human Machine Interface.

I. INTRODUCTION

PLC is used as replacement of hard-wired relay and timer logic control system. PLCs have the edge that it has the possibilities to modify a control system without having the rewrite connections to the input and output devices. The only requirement being that an operator has key in a different set of instruction. The result is a flexible system. The storage unit of PLC is battery backed memory and/or EEPROMs. PLC is designed for extended external temperature range, immunity to electrical noise and this mechanically more strong and resistant to vibration and impact. The main aim of our paper is to control the industrial timer in automatic machines.

II. EXISTING METHOD

In existing method the timer controller system is operated using relays and cables .In relay systems are used more wires, relays and other components are not used in PLC.

This relay system can add an entirely new physical component. On top of that, relay system of the proper wiring to make that timer work for the specific motor. In relays system has we used more relays and wire. This system is not cost efficient.

III. PROPOSED METHOD

The proposed method is PLC based industrial timer controller. The Proposed method includes following components are

Input device	Output device
Power supply 24v 5A	Red LED
HMI	Green LED
Start Button	Buzzer
Emergency Stop Button	Industrial Oven

Table 1.Input Devices and Output devices Components

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In the system we use DC power supply 24VDC 4.5A. 24V 5A power Circuit using LM7824.



Figure 1.230V AC to 24V DC Power Supply

For this AC 230V to 24V DC transformer steps down the mains voltage. The positive voltage regular IC is LM7824. This voltage is then rectified by the 10 A diode bridge. It produce regulated 24V DC output, the output current of that IC is not more than 1.5A therefore a TIP2955 transistor is used to amplify the output current to 5A. It is important to use suitable heat sinks with the IC and transistor. For the system power supply, AC (220VAC 110VAC), DC power supply (24V DC).

It is used for storing procedures. Here delta series PLC is used. Delta series PLC provides high speed and it contains high reliable application in all industrial automation systems. The cost efficient DDVP-PLC helps various convey protocols, relating delta's AC motor drive and human machine interface and temperature controller through the industrial network into a complete" Delta solution" for all users.

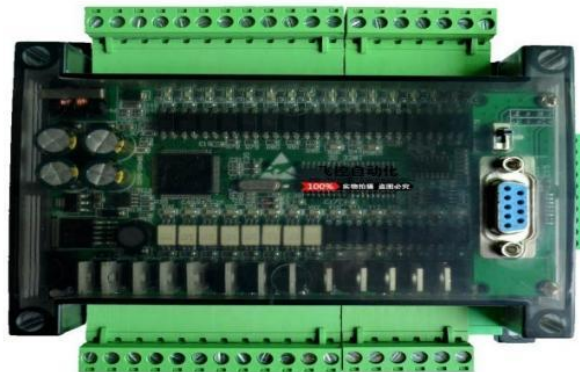


Fig.2. Programmable Logic Controller

(Mitsubishi-FX2N) 2N20MT-4AD2DA-2U

Fig 3.shows Human Machine Interface (HMI) LED Text display OP320. HMI is software used to monitor and control the whole system. The HMI is used to view effectively all system alerts, warnings and functions as well as change set point.

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Figure 3.Human Machine Interface

PLC (Programmable Logic Controller) require a program (or software) for their operation. In the present work, GX Work 2 software has been used to write a program for PLC. Programmable Controller CPU parameter and Network parameter can be set with GX Work 2.The programming is done by connecting the parameters which are required for the system. The parameter GX Works 2 enable to set easily, monitor, and testing the parameters.

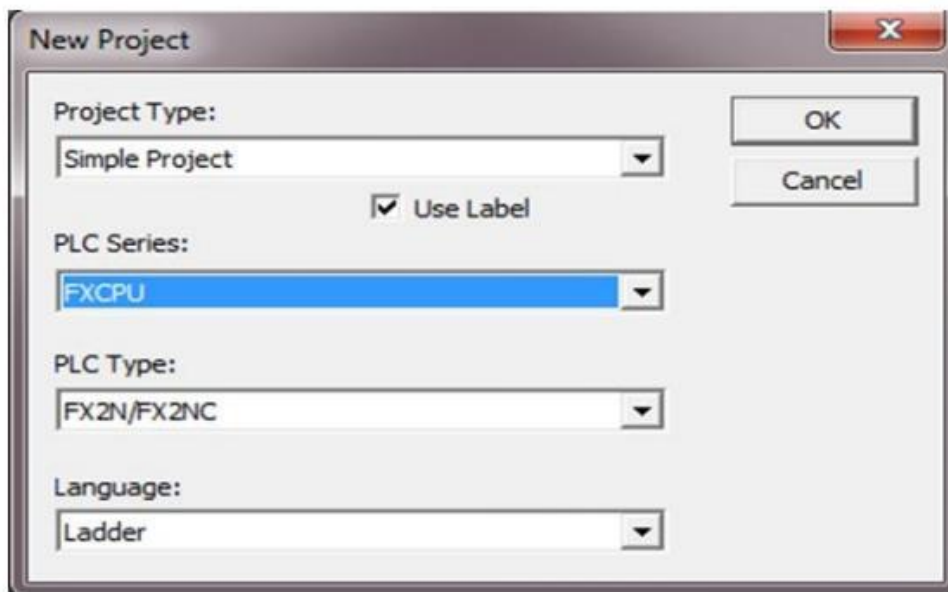


Figure 4.GX Work 2 Setting Parameter.

PLC programs are return in special application on a computer. The program is stored in the PLC system or RAM or some other non volatile flash memory.

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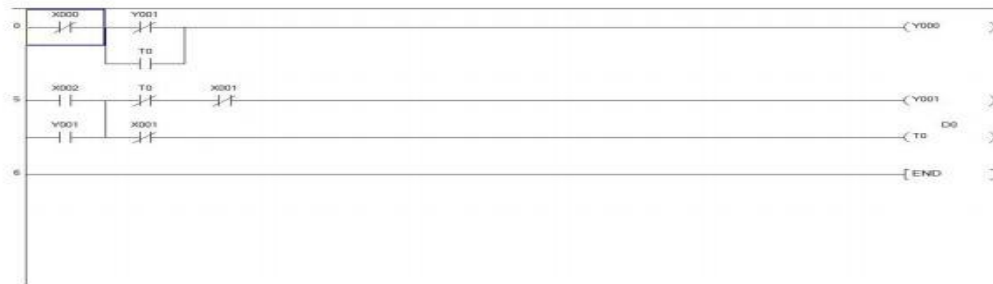


Figure 5.Ladder Diagram of Start X000

The first step shows inputs are X000 and X002. The output is Y000. X002 is start button, output is Y001 running.

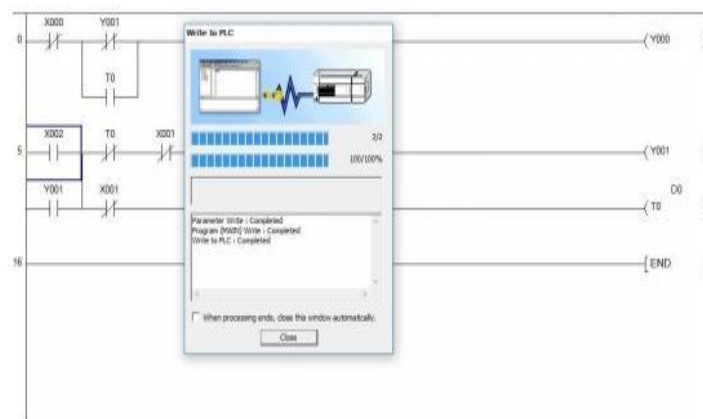


Fig 6. Ladder X2 is Start Read

The second step shows inputs are X002 and X001, X002 is normally ON and X001 is normally OFF. X002 is started to output y001 timer working. Y1 us connected to the relay module drive oven.

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Figure 7.Ladder X2 is Start Running

The third step shows the output is Y001. This is connected with the connected red LED and relay the timer. X001 is green LED heater OFF.

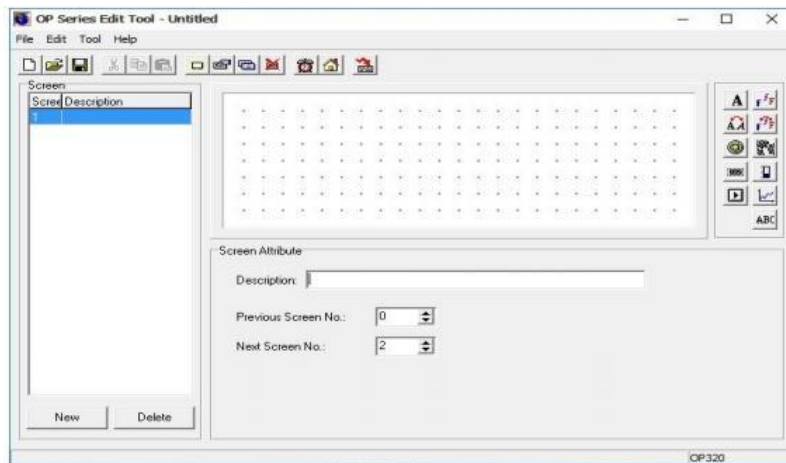


Figure 8.The Computer Screen Display HMI

After finishing downloading the screen's data, the power supply can cut and pull out the screen transfer cable OP-SYS-CAB0. PLC can be connected with OP320 and communication port by using PLC communication cable. AC power gives to PLC and OP320 at the same time.

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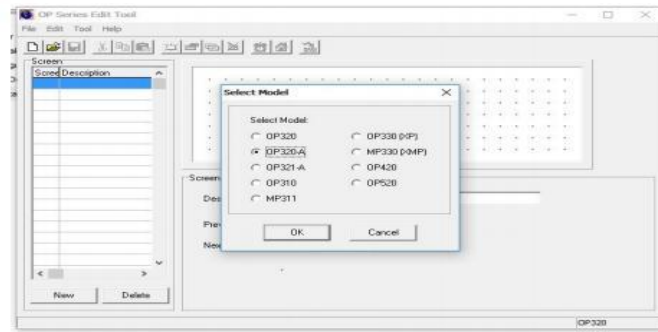


Figure 9.HMI Start Setting Run

Power Supply 24v dc output is used to control PLC, HMI. This circuit is controlled by a PLC (Programmable Logic Controller).

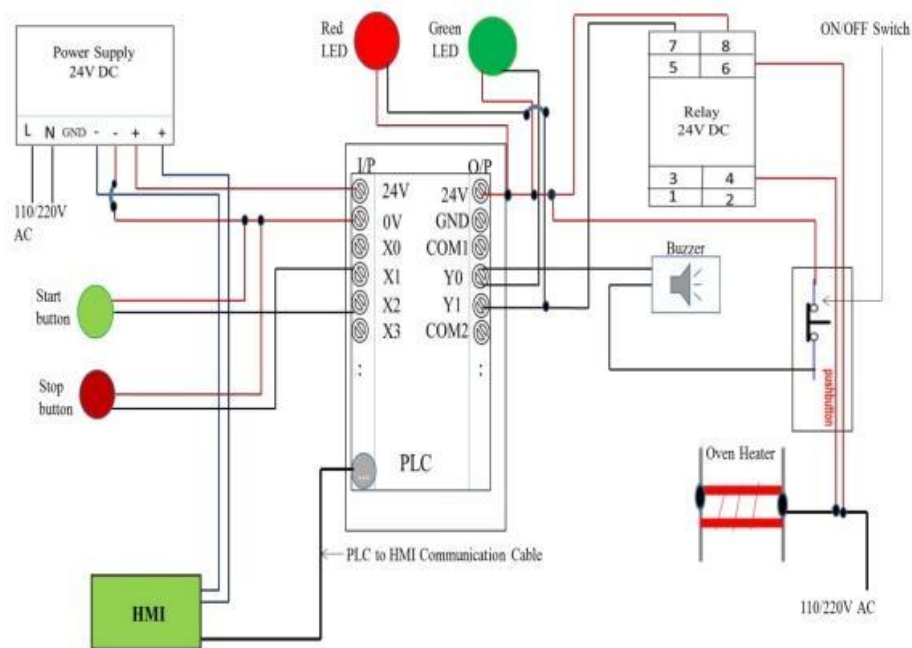


Figure 10. Overall Circuit Diagram of Industrial Timer Control

The timer block is used to give information to the system. when it should turn ON and turn OFF. This can be checked by clicking on program configuration block which it worked by set program by ladder logic. This time set by ladder program.

B11 is multiple machines such as conveyer and motors etc. B002 is timer block is shown fig.11.

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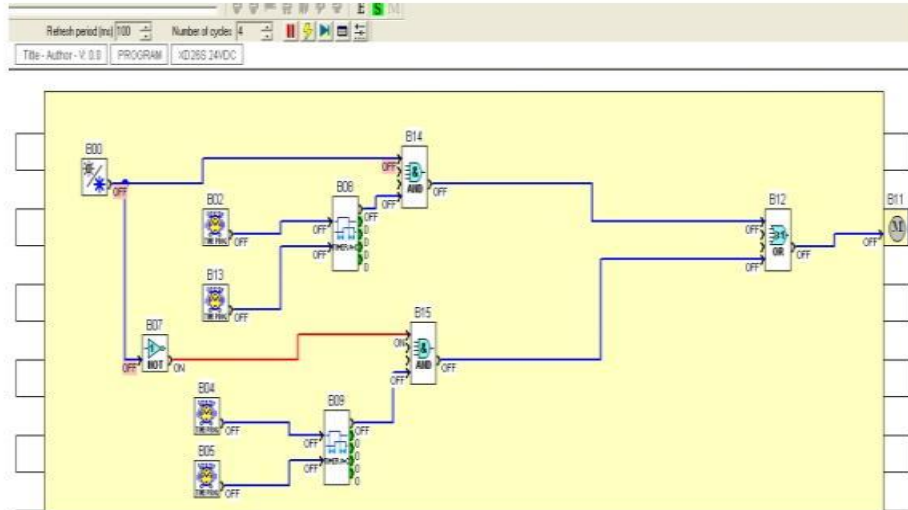


Fig.11 program configuration

Next step is to select parameter Task Bar of B02 timer block. During specified time which machines are turn ON or OFF is set to be the block shown in Fig 12.

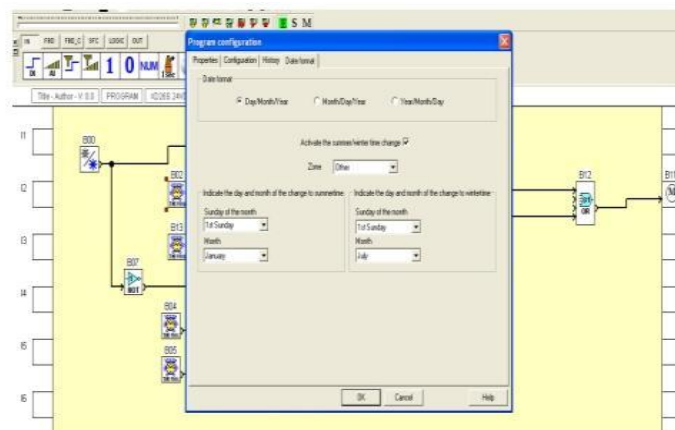


Fig.12Timer program block

Next step time set to be which unit operating in which time. shown in Fig.13.

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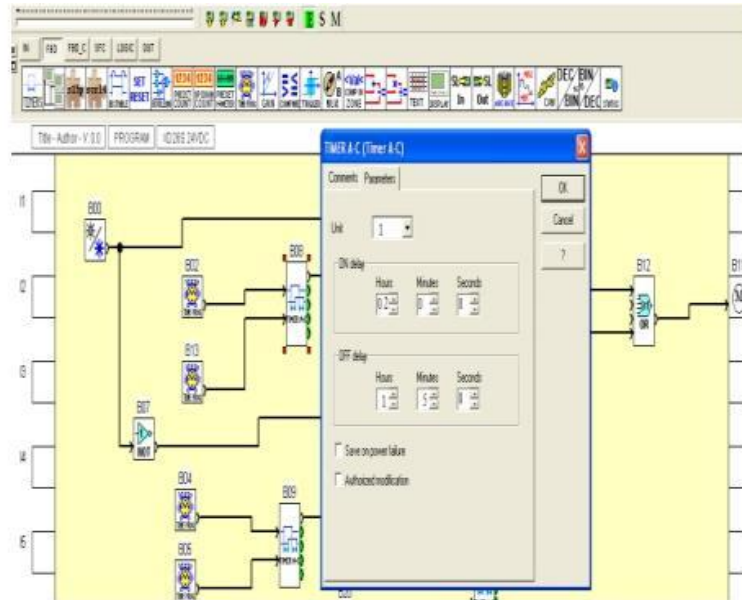


Fig.13 Unit timer block

Finally all values of blocks were programs are simulated. The program are simulated. The programs are simulated by PLC software. The programs written according to the specified time.

IV. RESULT

The result of this paper is to control time in oven using plc. In one unit motor is connected and other unit conveyor is connected. A motor is used for a required process [ON] at that time the conveyor is at OFF position. After the completing the unit one process the conveyor want to get start. These two process depend on time by controlling time, the process get completed. Now a days the industries except all work have to be done in speed .But this cannot be done by human beings as efficient as the machine could do. So they use plc automation. The simulated figure shown in 14,15

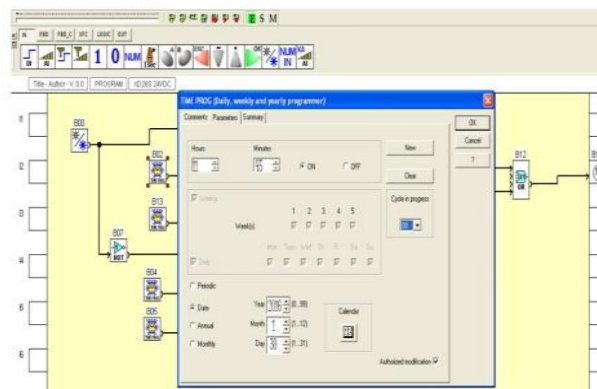


Figure.14 Simulation OFF Time

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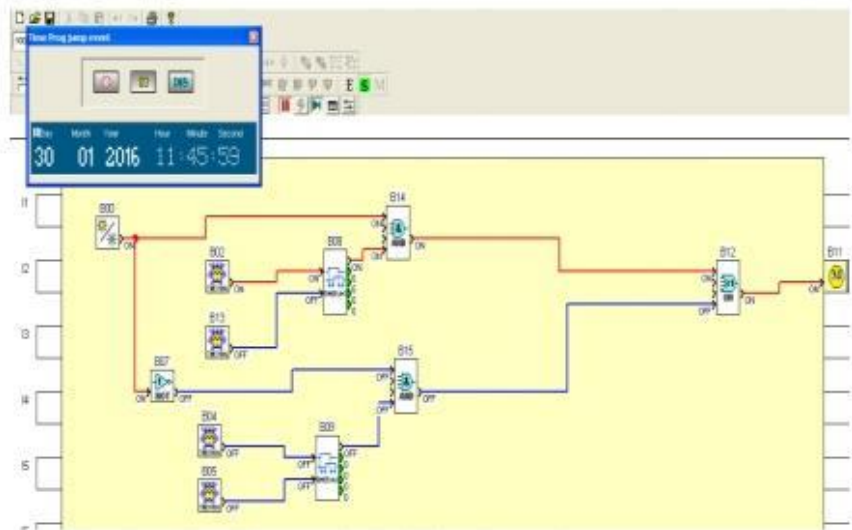


Figure.15 Simulation ON Time

V. CONCLUSION

In this paper, an approach for controlling time by using PLC is proposed. The proposed controller gives fast reliable, and power efficient of controlling time and save large amount.

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