Online Server Based Monitor & Controll of Industrial System using PID with Coding

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Abstract— IN this system having heater mechanism with thermocouple, thermocouple will sense the temperature and gives the data to delta controller (after analog to digital conversion). After that digital controller passes the data to PLC controller through RS-485, PLC programming will results in when temperature is low, heater will start and buzzer blows when limit exceeds as well as when temperature is low heater will start again and cycle will repeat from program loaded in PLC.

Keywords: PLC controller, PID, SCADA

I. INTRODUCTION

A. Problem Summary:

We live in the world where everything can be controlled and operated automatically; automation is process to control industrial machinery and processes by replacing human operation.

Making has always to use technologies in order to improve his life. From the very beginning man has looked for a better way of life. But in now days he has continued to improve his environment, both at work and at home. First all work is done by manually there for more time consume and work is not proper there for in our days that work we do with automation for the accuracy and less timing.

When we use manual temperature heating then many problems is created, in manual temperature heating chamber more time consume and chances of damage is more. Manual temperature heating due to high temperature the metal are burnt or destroyed this is the main problem and also labor cost.

In the manual system of temperature chamber labor cost are high to control manual but it is also not accurate some time metal brunt or destroyed this is the major problems.

B. Aim and Object of the Project:

Our main aim is reduced main power and accurate the operation of temperature control. We are control the temperature control of heater by using plc. IN this system having heater mechanism with thermocouple, thermocouple will sense the temperature and gives the data to delta controller (after analog to digital conversion).

After that digital controller passes the data to PLC controller through RS-485, PLC programming will results in when temperature is low, heater will start and buzzer blows when limit exceeds as well as when temperature is low heater will start again and cycle will repeat from program loaded in PLC.

We describe a temperature-control system for solutions in free flow, suitable for electrophysiological or optical studies of isolated cells, natural epithelia or cell culture monolayers. The system is small enough to be located close to the preparation and was designed specifically to be

coupled to the inlets of a modified, continuous-flow Using chamber, allowing rapid change of the solutions bathing tissue surfaces. The system consists of a highly compact monoblack heating unit and a control circuit. Solutions from different reservoirs, kept at room temperature or lower (from a 40 degree), can be rapidly switched at the inlet of the heating unit by manual.

Now after the temperature rise to 70 degree then the heater can be stopped automatically. But the temperature rise due to automatic temperature rice 90 degree and after down slowly after temperature reach the 40 degree then heater start automatically.

II. GENERAL INSTRUCTIONS
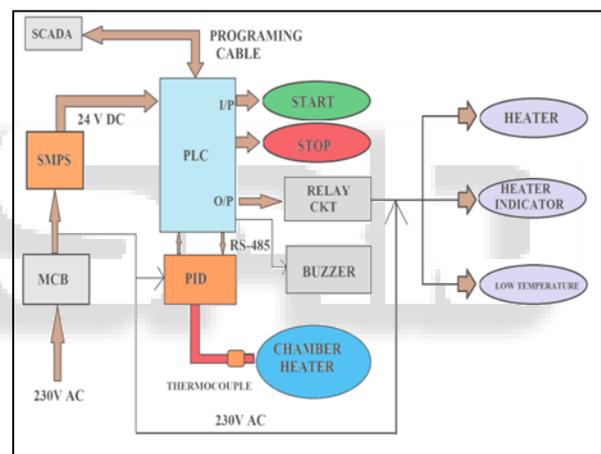
A. Block Diagram

Fig. 1: block diagram

As shown in the figure block diagram of online server based on monitor and control of industrial system by using PID with coding. We know that the plc input voltage is 24v but in the industry the single phase supply line that voltage have 230v than first fall we convert the 230v to 24v dc then SMPS are. SMPS are nothing switch mode power supply that converts ac voltage to dc voltage.

We know that rectifier also used for ac voltage to dc voltage but in the rectifier system there are some amount of the ac voltage is there then we decide that we used the SMPS. The single phase supply is applied to the SMPS this is convert the 230 voltage to purely 24v dc voltage. Then after the 24voltage is apply the plc in the plc programming write by using the wpl soft. After the plc output voltage is apply to relay card. Relay card is used to switching the power because in our system there are some components are used in the ac voltage then we used the relay card.

In the PLC there are no of output and input in our project there are two input and six output are used in our project output are used single phase supply. Now we can used the relay channel to switching the voltage In the project there

are two push button start and stop button and there voltage is 24v dc. And also there are three indicator low indicators, high indicator, and heater indicator, push button are used for manual work which person is used manually. The output of PLC is 0volts it is apply the push button and another and of push button is apply the 24v volt through the SMPS
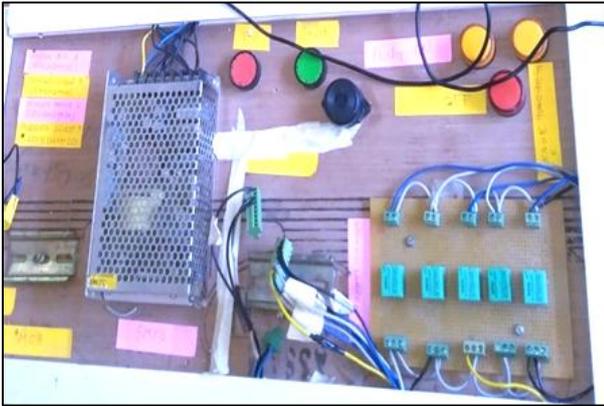
B. Model Diagram

Fig. 2: Model diagram

This is the model diagram it is not complete model but panel wiring just completed now you see the arrangement of components the SCADA is not connected and also heater and thermocouple is not connected now SCADA and PLC are connected but we used the kep server software. This is the software it can decide the communication of plc and scada and after used the automation this is the online server. The PID is connected in the plc output in the relay channel. PID input supply is 230 voltage this is applied by switching in the relay card. PID is used for analog signal converted in the digital signal. Thermocouple is connected in the PID output.

Thermocouple value is change by varying time and its value is analog signal then PID is used to convert the analog signal into the digital signal and also it does detect the proper value of temperature. Heater is connected in the output of the relay card and it is used to increase the temperature of the heating room.

After we collect data of scada and complete the design in scada and connect with plc by using kep server ex or modbus communication. As shown in the figure the scada design in this design the moisture section and gas section only for stationary do not working. The main component is PID meter.
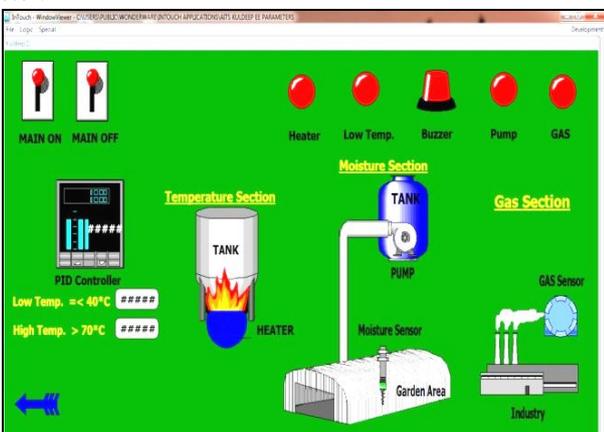

Fig. 3: scada design

Now the MCB is directly connected to the SMPS the single supply is converted to the purely dc voltage after this dc voltage is apply to the PLC. The input of PLC is push button which is used in manually work and the output of PLC is relay card. Now the temperature is 40 degree then heater is start automatically the temperature is rice to time after its reach the 70degree the heater is stop but temperature do not decrease but while its increase some degree after its decrease to reach minimum temperature level at that time buzzer is start and heater is also start this automatically system

SCADA is used for office work you also control the temperature in office using the SCADA system. The PID is used convert analog to digital signal the output is connected the thermocouple. Thermocouple sense the temperature but they analog value this is requirement of PID which is used to convert analog signal to digital signal. That means our project work in three dimensions manually, automatically, and also control.
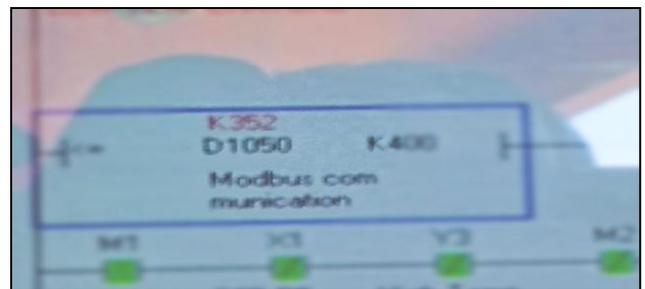

Fig. 4: PID indication

As show in the figure takes reading in a delta plc program this reading is same as the PID temperature reading that time temperature is k35.2 that means 35.2 Celsius. As shown in the figure 4.

This is the PID meter and takes the reading. After the system is start and temperature are increase. We know that this is the automatic system and automatic system is very useful.

Fig. 5: Low indication

But in this case minimum temperature is 40 degree and maximum temperature is 70 degree that means as shown in the figure 5 temperature is 35.2.

This is the low temperature that means low level indication on.

After heater is on the temperature reach the 40 degree then low indication is off. And heater start as show in the figure
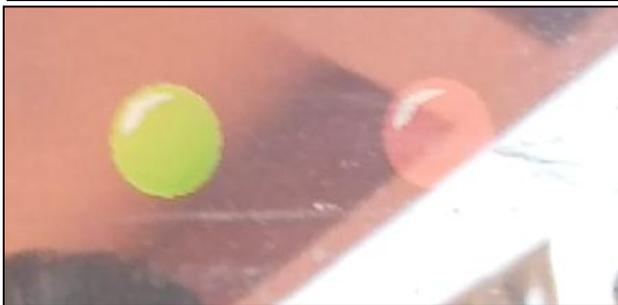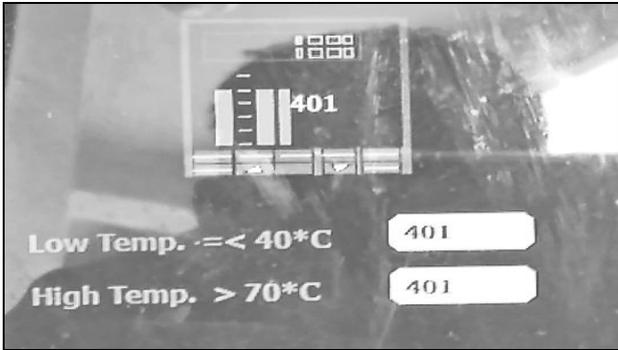

Fig. 6: heater is on

After some time temperature is high and reaches the 70degree then buzzer on and heater is off. After temperature increase due to current flowing in the heater coil Temperature reaches the 134 degree.

Fig. 7: high indication

Now we know that in the heater is off but sometime current is flow in the heater due to current coil magnetizing current is produce in the heater then the temperature is increase to some limit.

III. SOME IMPORTANT COMPONENT

−   PLC
−   SMPS
−   PID
−   THERMOCOUPLE

A. PLC (Programmable Logic Controllers)

First Programmable Logic Controllers were designed and developed by Modicon. These controllers eliminated the need for rewiring and adding additional hardware for each new configuration of logic. The new system drastically increased the functionality of the controls while reducing the cabinet space that housed the logic. The first PLC, model 084, was invented by Dick Morley in 1969. The first commercial successful PLC, the 184, was introduced in 1973 which was designed by Michael Greenberg.[1]
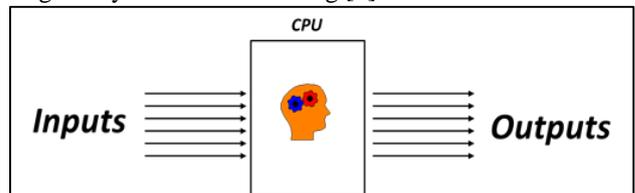

Fig. 8: PLC [1]

A PROGRAMMABLE LOGIC CONTROLLER is a solid state control system that continuously monitors the status of devices connected as inputs. Based upon a user written program, stored in memory, it controls the status of devices connected as outputs.[1]

B. PID [Proportional-Integral-Derivative]

A proportional-integral-derivative controller (PID controller) is a control loop feedback mechanism (controller) commonly used in industrial control systems. A PID controller continuously calculates an "error value" as the difference between a measured process variable and a desired set point. In practical terms it automatically applies accurate and responsive correction to a control function. The PID algorithm restores from current speed to the desired speed in an optimal way, without delay or overshoot, by controlling the power output of the vehicle's engine.[2]

Fig. 9: PID [3]

C. SMPS [Switched Mode Power Supply]

The electric power is not normally used in the form in which it is produced or distributed. Practically all electronic systems require some form of Power conversion. A device that transfers electric energy from a source to a load using electronic circuits is referred to as power supply. A typical application of a power supply is to convert utility AC voltage into regulated DC voltages required for electronic equipment. There are two broad categories of power supplies:

− Linear regulated power supply
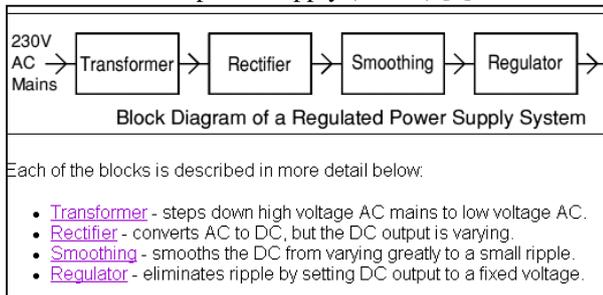− switched mode power supply (SMPS).[4]

Fig. 10: SMPS block diagram

Fig. 11: SMPS [4]

D. Thermocouple

A thermocouple is an electrical device consisting of two different conductors forming electrical junctions at differing temperatures. A thermocouple produces a temperature-dependent voltage as a result of the thermoelectric effect, and this voltage can be interpreted to measure temperature. Thermocouples are a widely used type of temperature sensor. Commercial thermocouples are inexpensive, interchangeable, are supplied with standard connectors, and can measure a wide range of temperatures. [5]
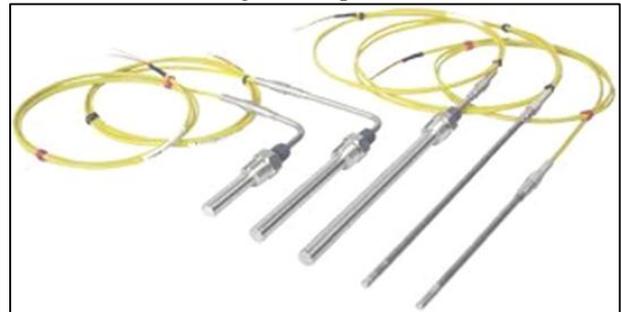

Fig. 12: Thermocouple [6]

E. Advantages:

− Good Accuracy
− Smart Work
− Less Maintenance
− Fast Response

F. Disadvantages:

− Cost High
− Wiring Complex

G. Application:

− Ceramic Industry
− Food Packaging Industry
− Oil Industry
− Furnace Industry

H. Features:

− Control & Monitor by one place only use of SCADA.
− Easily install systems.
− Fast Control.
− Performance Level High.

I would also like to thank my friends. We shared a lot and bonded together when we worked side by side and faced difficult times together. Also I would like to thank H.O.D. Prof. R. B. Vaghasiya for give me the instrument when I want in project work and give all facilities in collage during the project work.

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