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Temperature Controller Three Part Drying Machine

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Abstract: ***This article analyzed the temperature control system of the dyeing machine in the textile industry, adopted the technology of PLC to automatically control the temperature and realized the automatic temperature adjustment in the work process of the dyeing machine. The spot adjustment justify that this method could fulfill the basic requirement of the dyeing machine to the temperature. The wet fabric after dyeing, is dried by using this new designed process. The fabric is passed through three compartments at different temperature. The steam is applied at all three compartments for drying the fabric. Blower, exhaust fan and nozzle adjustment are also involved in this process.***
Keywords: dyeing machine, PLC, wet fabric, nozzle adjustment.

I. INTRODUCTION

In current scenario, one of the modern need is cloth which is becoming very colorful. Dyeing the fabric and drying them safely become more complicated. In order to reduce the manual work, we have proposed an idea named "Temperature Controller Three Part Dying Machine". The wet fabric after dyeing is dried by using this process. The fabric is passed through three compartments at different temperature. The steam is applied at all three compartments for drying the fabric. The blower is used for managing the temperature around the chamber. The exhaust fan is used to avoid the overheating of the chamber. The nozzle adjustment which is used in this process helps to maintain the fabric in the perfect position.

A. Applications

Industries are facing difficulties because of burning of the fabrics in the dryer machine due to overheating. But in this proposed process the temperature is controlled automatically if the temperature in the chamber reaches the fixed temperature and this helps to avoid burning of the fabrics. In this method, in the case of emergency the process can be stopped in the middle.

B. Objective

The main objective of this project is to sense the temperature of the chamber. The LCD display used in this process will display the temperature of the chamber. This project is used for automatic drying of a wet fabric. It also used to reduce the manual work in the textile industries. The aim of the project is to control the temperature of dye in all the three compartments and also to set the respective temperature of fabric in every compartment and to maintain it .The compartment which is mentioned here is the part through which the fabric goes in or out.

II. LITERAUTRE SURVEY

This article analyzed the temperature control system of the dyeing machine in the textile industry, adopted the technology of PLC to automatically control the temperature and realized the automatic temperature adjustment in the work process of the dyeing machine. The spot adjustment proved that this method could fulfil the basic requirement of the dyeing machine to the temperature. The textile machinery manufacturing of China has been quickly developed for almost twenty years and has acquired great achievements, and the technical level and product stability of textile machinery have been fully enhanced. The automatic control of the textile machinery takes the sports control as its core, and is assisted by the textile technical parameters. In recent ten years, the electric power electronic technology, computer control technology and network Communication technology have been applied and extended in the control and production management of the textile machinery quickly, which make the mechanical and electronic integration level of China fully enhanced.

The parameters of the textile technology are numerous, which generally includes temperature, pressure, flux, liquid position, length, speed and displacement. The dyeing technology of the textile has strict requirement of the temperature, and the temperature

ascending process, temperature keeping process, temperature descending process of the dyeing trough must accord with the technical requirements, and the manual control is very difficult. If the used machine is the small sample machine, it may bring trouble for the bulk samples. And the production equipment's will make the color Relay difficultly and induce serious kettle difference, and finally bring unnecessary losses for the production. Therefore, the automatic temperature control of the dyeing machine is very important. The control system is required to freely set up the temperature ascending curve, temperature keeping curve, temperature descending curve, and the operation time, actual temperature and process temperature in the work process can be displayed to ensure the right implementation of the technology.

The control objective is the dyeing sample machine, and the structure of its temperature system is seen in Figure 1. The temperature control range of the system is from 20 to 150 centigrade degree, and because the water cannot achieve 150 centigrade degree, so the glycerine is adopted. The glycerine can achieve 150 centigrade degree under normal pressure. When the dyeing machine is working, the temperature of the glycerine in the dyeing trough must be changed according to the technical requirements. If the temperature is lower than the set value, the temperature control system should close the heat switch 7, heat glycerine through the heating wire and stop heating until the temperature achieves the set value. If the temperature of the glycerine is higher than the set value, i.e. the excessive adjustment occurs, or the equipment is working in the quick descending stage of the temperature, the temperature control system will connect the cooling valve 8 to drop the temperature of the glycerine. Common temperature controller can implement temperature keeping control, which is used in some prior dyeing machines, and if the automatic degree is further enhanced to make the equipment ascend, keep and descend the temperature according to needed speed until the whole technical process ends, the simple temperature control cannot Fulfill these requirements, and it is very necessary to design a sort of reliable, convenient temperature complete automatic control system with perfect functions.

III. PROPOSED SYSTEM

In this project the wet fabric after dyeing, is dried by using this process. The fabric is passed through three compartments at different temperature. After leaving the third compartment the fabric is dried and it is collected. The steam is applied at all three compartments for drying the fabric. Blower, exhaust fan and nozzle adjustment are also involved in this process.

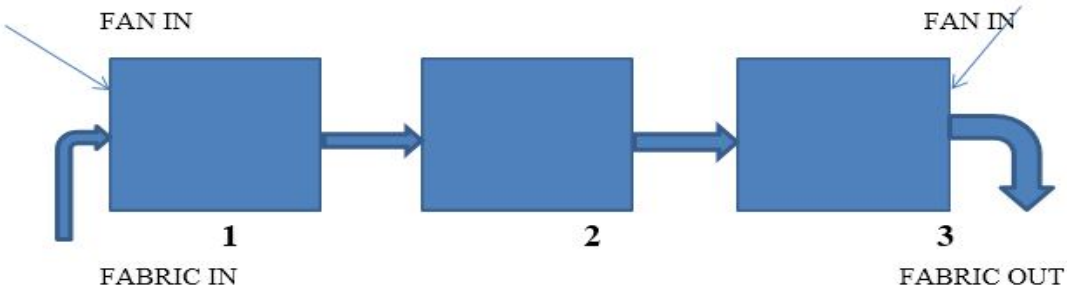


Fig 1 : General block diagram

IV. COMPONENTS DESCRIPTION

A. Resistance Temperature Detector (RTD)

Resistance Temperature Detectors (RTDs) are temperature sensors that contain a resistor that changes resistance value as its temperature changes. RTDs work on a basic correlation between metals and temperature. As the temperature of a metal increases, the metal's resistance to the flow of electricity increases. Similarly, as the temperature of the RTD resistance element increases, the electrical resistance, measured in ohms (Ω), increases. RTD elements are commonly specified according to their resistance in ohms at zero degrees Celsius (0° C). The most common RTD specification is 100 Ω, which means that at 0° C the RTD element should demonstrate 100Ωresistance.

A simple rule of thumb is that the more wires an RTD has the more accurate it is. The entire RTD assembly is not platinum. Among other issues, constructing an RTD in that manner would for most purposes be prohibitively expensive. As a result, only the small RTD element itself is made of platinum. As a practical matter the resistance value of the RTD element would be useless without a means to communicate that resistance to an instrument. Accordingly, insulated copper wires typically connect the RTD element to the measuring instrument.

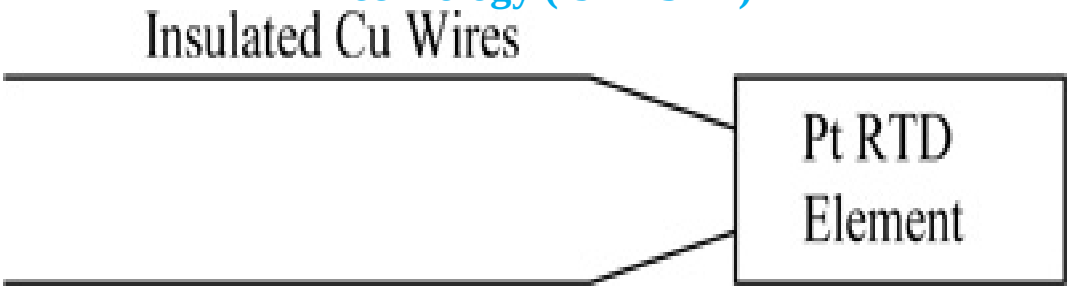


Fig 2 RTD Element

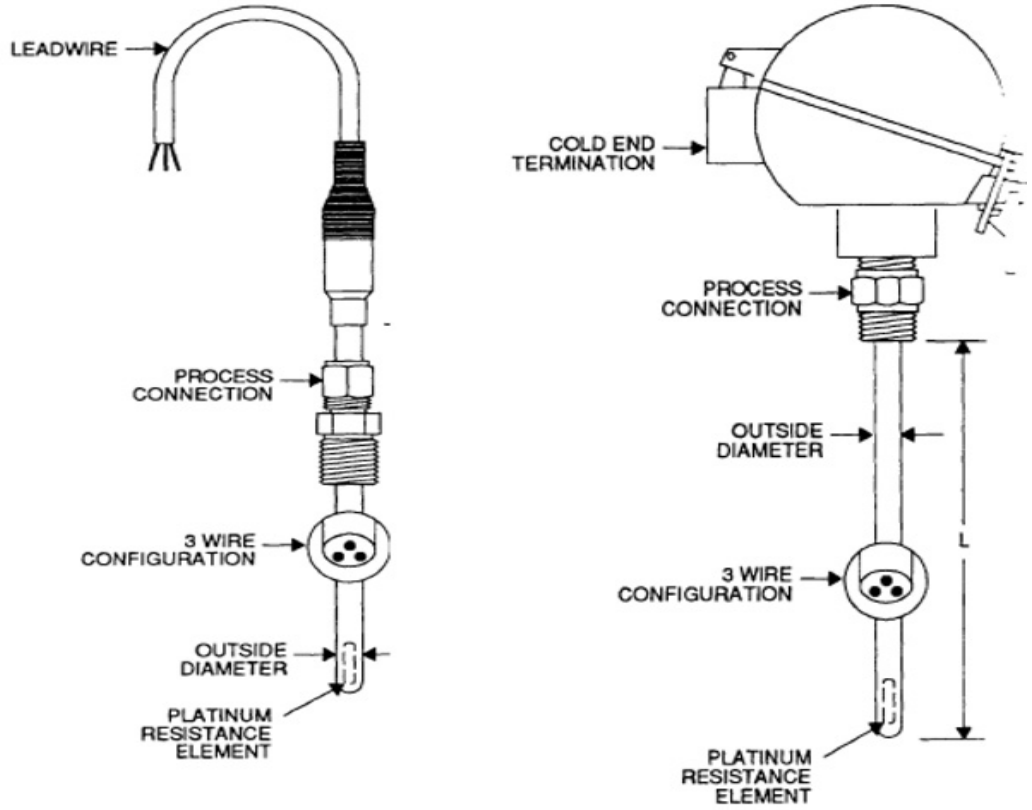


Fig 3 RTD Sensor

B. Programmable Logic Controller

A programmable logic controller, PLC, or programmable controller is a digital computer used for automation of typically industrial electromechanical processes, such as control of machinery on factory assembly lines, amusement rides, or light fixtures. This can be used as storing procedures, handy extending principles, functions of sequential/position control, timed counting and input/output control are widely applied to the field of industrial automation control.

C. Main Module: Dvp28sv2 11t

The new generation DVP-SV2 PLC is the high-end model of the Delta DVP-S series. It provides larger program capacities and data registers for more demanding and complex applications.

1) Very High-speed pulse output: 4 sets of 200kHz pulse output
2) Supports max. 4 hardware 200kHz high-speed counters
3) Increases many motion control instructions to meet the applications that require high-speed and high-precision positioning control such as labelling machines, packaging machines and printing machines?
4) Offers linear / arc interpolation motion control
5) Provides up to 16 external interrupt pointers

Fig 4 Main module

D. Extension Module: DVP16SP 11R

In this extension module DVP16SP 11R is used. Here there are8 inputs pins and 8 outputs pins are used. And the total number of extension module used is five.

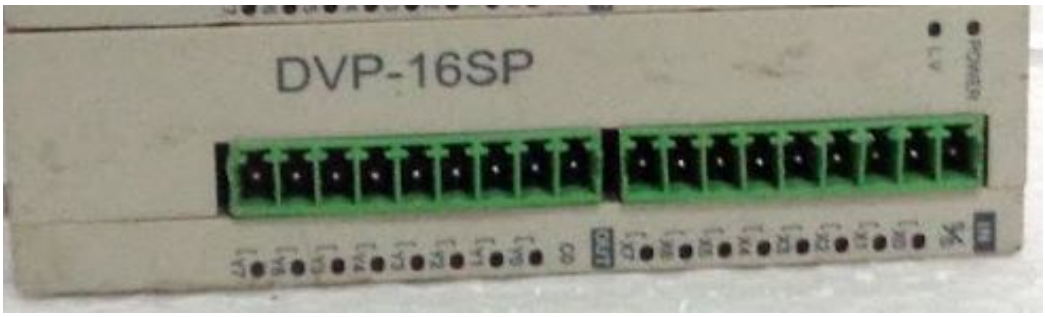
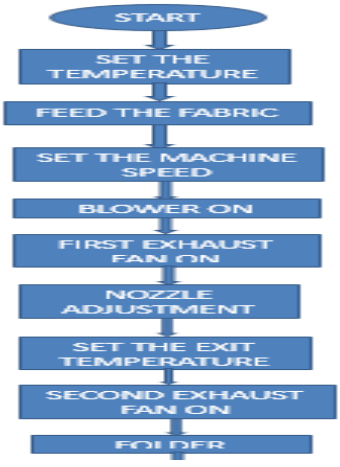


Fig 5 Extension module

V. RESULTS AND DISCUSSIONS

As shown in the below flowchart the when the dryer machine starts after inserting the fabrics in the machine. The temperature is set to control the overheating and also to maintain the temperature. The fixed temperature for the first will decrease till the end (the first compartment have the highest temperature and the second has lower than the first one and the last one have the least temperature is set than other compartment).after setting the temperature the fabric is feed into the first compartment for drying and the machine speed is also set manually (according to the cloth thickness the machine speed is manually fixed). When the fabrics are in then stream will be allowed in the first compartment and respectively. Once the stream is in then the blower is on in order to spread the temperature around the compartment. When the temperature exceeds the original temperature then the valve in the compartment closes and the exhaust fan is on. There is a nozzle adjustment in order to maintain the fabrics in same position.



. VI. CONCLUSION

Automatic closing of the valve after the proposed temperature is reached. This helps the fabrics to dry in exact temperature which will not make the fabric to burn and also the nozzle adjustment which will maintain the position of the fabric in the same position which will result in equal flow of temperature.

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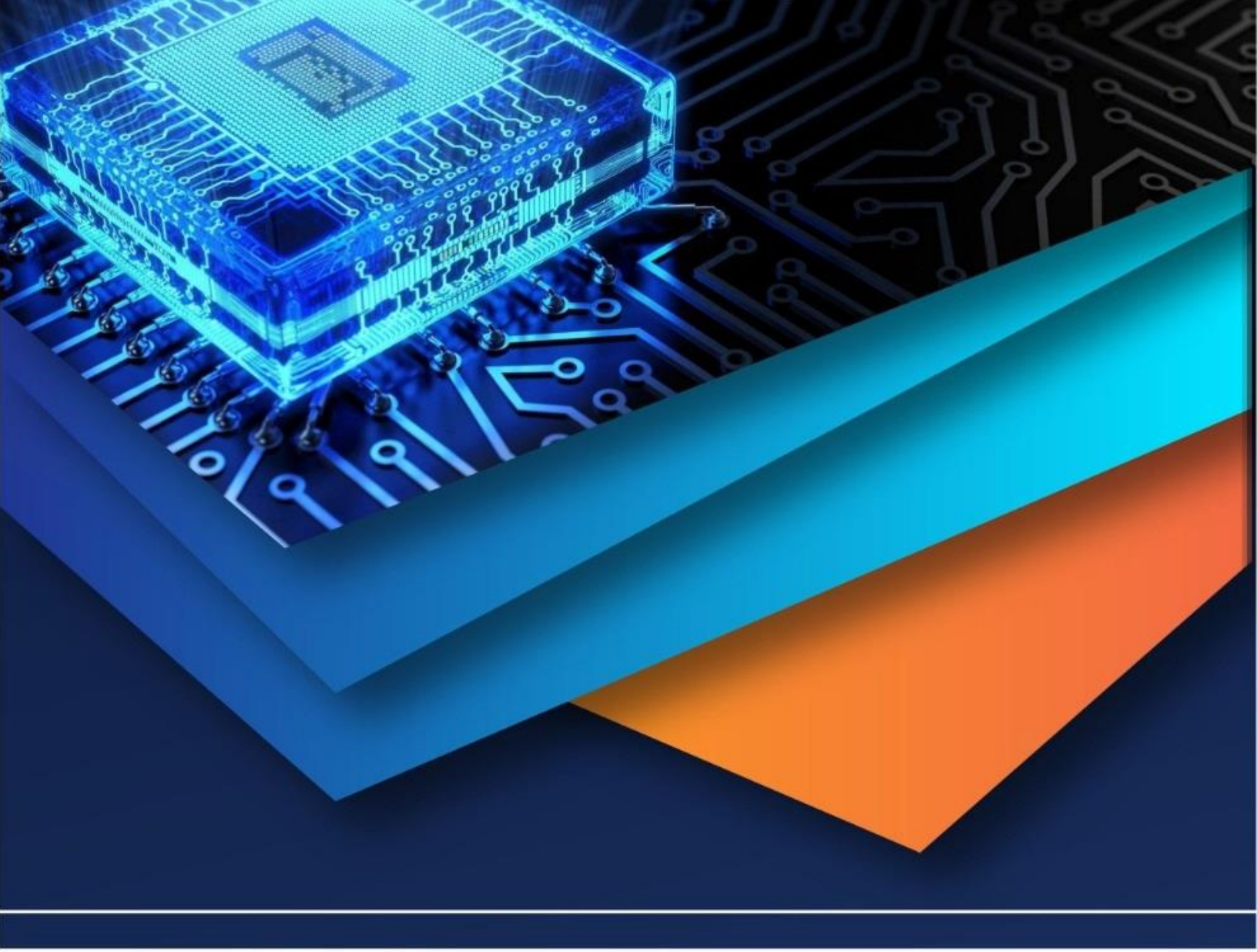

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