TWO PARAMETER CONTROLING OF A TANK

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Abstract— **This project presents design and analyze of two parameter control system for ensuring system reliability, safety and robustness in a cost effective way. The control system contains a feedback PID loop for temperature of water and tank level signal. we done this project by using the PID controller for temperature and pulse width modulation technique for level control in these we deals with two signals comes from the two different sensors. This is very chip and simple method as compare to others. In this summed the all signals to reach the set point for the actuation. Here we control two parameters like temperature and level of the tank. In many systems we seen that for controlling of water flow there is a need of control valve which makes system more costlier. Here we develop an pulse width modulation based controller to control the dc motor which act as a water pump. In case of temperature control we used resistance temperature detector.**

Index Terms— **Two parameter Drum Control, PID Controller.**

I. INTRODUCTION

The aim of this project is to simplify operation of controlling two parameters of a open tank and also reduce cost compare to other techniques. In industry it is very important to measure and control the temperature and level in every plant. So this can be done by several methods, but the main factor affected on this is cost. So by using motor with Pulse width modulation technique the cost will be reducing. This is very chip and simple method as compare to others in this summed the all signals to reach the set point for the actuation. Here we control two parameters like temperature and level of the tank in many systems we seen that transmitters are used to send the signals to the PID controller. In case of hazards like boiler or heat exchanger there is a need of non-contact type sensors so for that purpose we used ultrasonic sensor for level measurement. For temperature we take resistance temperature detector.

II. PROCESS MODEL DEVELOPMENT

The performance of the two-parameter control system during transient conditions makes it very useful for general industrial and utility boiler applications. Plants which exhibit load characteristics of this type are those with mixed, continuous, and batch processing demands. In this system the temperature controller (TIC) is use to control temperature. Feed water flow is controlled by flow controller (FIC). Feed water flow is measured by the ultrasonic flow transmitters. The feed water flow controller produces the necessary corrective signal to feed water flow pump to maintain feed water flow.

## III. CONTROL LOOP OF TWO PARAMETER DRUM CONTROL SYSTEM

Here the primary control loop consists of TIC and secondary control loop having FIC. The feedback compensators both for primary and secondary loop are used to improve the control action of the whole control loop. The primary and secondary loop is the feedback control design of two parameter drum control system. The feed forward compensation which main objective is to minimize the effect of disturbance, the temperature in drum element control system is sum with the output of secondary loop controller (feedback control) and finally gives PWM signal to the final control element, the feed water flow pump.

III. INSTRUMENTATION DIAGRAM

- Temperature Loop-
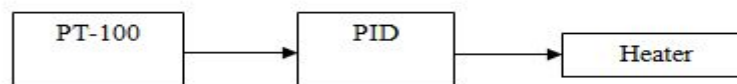
- Flow Loop-
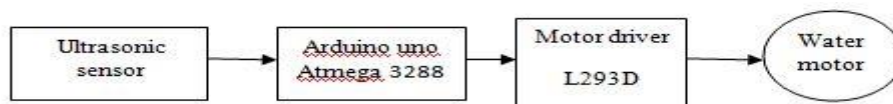
IV. PROSPOSED SYSTEM ARCHITECTURE

The main objective of Design and controlling of two parameter is to provide a service to maintain the set parameter in the field with efficient way that the desired Temperature & level of water. The system architecture consists of open tank with heating equipment , Process fluid dc motor, Inlet of water through pipe, a simple heater, controlling motor with pulse width modulation technique& PID controller. Power supply and all the required electrical wiring is done at the loop itself. In case of temperature it is need to control as per desired level because it may takes hazardous condition, so we use resistance temperature detector sensor(pt-100) for sensing it. This sensor gives an input to the PID controller for comparing the measured and processed variables

to obtain corrective action for heater. While level control, the ultrasonic sensor measure the height of water and generates an equivalent signal to the arduino controller which compare the set point & control the dc motor used for pushing of water. The purpose of the system is to offer to Control fluid temperature & the level of liquid from the flooding at the Set Point and Control the Temperature by manipulating the heater current.

V.   METHODOLOGY

This is the system for maintaining the hazardous parameter at the safe and working level. This equipment includes following systems:

- PID Controller
- Pulse width modulation.
- controlled variables

1.   PID CONTROLLER

 The distinguishing feature of the PID controller is the ability to use the three *control terms* of proportional, integral and derivative influence on the controller output to apply accurate and optimal control. The block diagram in the below shows the principles of how these terms are generated and applied. It shows a PID controller which continuously calculates an error valve as the difference between a desired set point SP and a measured process variable PV and applies a correction based on proportional, integral and derivative terms. The controller attempts to minimize the error over time by adjustment of a control variable, such as the opening of a control valve to a new value determined by a Weighted sum of the control terms

2.   PULSE WIDTH MODULATION

Controlling the speed of dc motor can be done by different ways like using a potentiometer and also by a controlled current to the armature. Apart from these techniques, pulse width modulation is the effective way to implement motor speed control. Pulse width modulation is a digital technique for coding a digital data into a pulsating signal which looks like a square wave. The applications including motor speed control, encoding messages in telecommunication systems, sound synthesis in audio amplifiers PWM find applications including motor speed control. PWM uses a rectangular pulse train whose modulation results in the average value of the pulse sequence. Most of the industrial process requires to be run on the certain parameters where speed of the drive is concerned. The electric drive systems used in many industrial applications require higher performance, reliability, variable speed due to its ease of controllability. The speed control of dc motor is important in applications where precision and protection are of essence. Purpose of a motor speed controller is to take a signal representing the required speed and to drive a motor at that speed.

3.   CONTROLLED VARIABLES

In this system, primarily the controlled variable is temperature & another one is water level of open tank. By using heater we heat the water inside the tank at its boiling point or a specific set point. the value of set point is given to the controller and then it controls heater current intensity. The another control variable is water level which measure by the ultrasonic sensor and gives input to the ardiuno controller. This causes the speed of dc motor will varying according to signal which comes from sensor.

VI.   RESULT

Hence we have control temperature and level of water inside the tank with safety parameters.

VII.   ADVANTAGES
- PID Controlling available.
- Non contact type level sensor.
- Provided safety.
- High accuracy.

VIII.   CONCLUSION

The system provides design and control of temperature and level the controlling of process temperature at set point done by system. The controlling of both is done by PID controller**.**

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