Reactor Automation

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Abstract: In this paper mention different method of temperature control. The main purpose of this work is to control pharmaceutical reactor process & its temperature by analyzing reactor process we conclude that the main thing is temperature control of reactor. In this paper mention different method of temperature control which is used in food, chemical & process industries. In these industries they used different types of method (closed loop control system, proportional control system, proportional-integral-derivative control system,and proportional-integral-derivative control system) as per their application. By studying many paper we conclude that PID control method is most suitable for the temperature control of reactor.

Keywords: PID CONTROLLER, PLC, SCADA.

I. INTRODUCTION

In chemical industries, pharmacy industries, food industries most important thing is improve product quality.to improve product quality most important control temperature of reactor, vessel & dryer. In previous days they use temperature controller or they manually control the temperature i.e. all valves they are operate manually observing temperature control unit. Because of manually operation sometimes temperature are undershoot or overshoot. For this reason product are damaged or product quality is very low. To improve product qualitytemperature control using PLC & SCADA is basic & most widely used process in industries. Now days PLC is used in many industries for improve product quality & fast production process. In last days they are use relay logic replacing relay logic now they PLC for fast process. PLC is programmable logic controller programmable controller is digital computer. It is a solid state digital and analog logic element it designs to make logical decision to control process. SCADA means supervisory control and data acquisition system which offers graphical & visual representation of process parameter even from the remote place. It provides possibility of monitoring as well as controlling the process parameter through GUI (graphical user interference). Using SCADA we can observe theany instrument from the control room. Programmable logic controller has ability to talk with SCADA by tagging PLC variable with SCADA images or function because of this tagging we can control process.

II. LITERATURE SURVEY

Temperature control is major thing in process industries. While working on this paper I have studied matter from various sources such as books, online articles and reference manual from this knowledge gain from this activity has been great help to us to understanding the basic concept related my project. This paper is explaining basic process of temperature control. In this paper in fig 4 shows an experimental setup of temperature control system. In this shows a halogen lamp &equipped with heat sink. Heating power is supplied by a power amplifier. An automatic reclosing, bimetallic switch ensure that overheating does not occurred.in this oven temperature is measured byPTCsensor. There is also use ventilator fan it located near heat sink [1].

In this paper we try to bring out most important and widely used method of control logic that can be implemented.

It explains with example of engine coolant fan coolant based on coolant temperature. The control logic software is used to vary the duty cycle to maintain the engine coolant temperature of certain range.in this paper describe the two major algorithm hysteresis & PI control[2].

In this paper design & implementation of electric furnace control. In this control furnace temperature using temperature sensor, PLC&SCADA is monitoring system [3].

In this paper system is design and control of big flow of high temperature and low temperature [4].

In this paper controlling temperature during burn in test.burn in product placed in oven burn in time is mainly depends on the device junction temperature. So junction temperature is control most important thing it is not control by open loop because its required lower than or higher than so close loop control system is used for this [5].

This paper is based on automation and beer formation process applied on beer plant. The main purpose in this plant is temperature control and it is control by proportional control system [6].

In this paper use adaptable PID controller based on analogic gate technique implemented using programmable logic controller to control temperature control using three way actuating valve [7].

III. BLOCKDIAGRAM&RELATED WORK
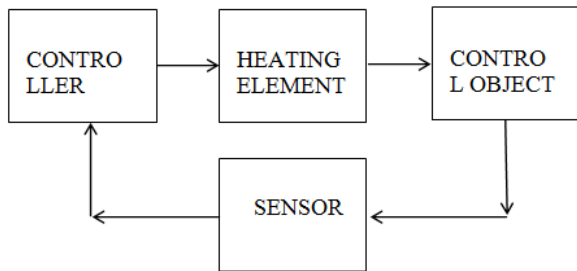
A. CLOSED LOOP CONTROL SYSTEM

Fig1:- Closed loop control

A closed loop control system is known as feedback control system means portion of the output is return back to the input of the system. Closed loop system is used for automatically achieve desired output. Closed loop control system is always using the action of output system to reduce the error of the system. Closed loop systems gives accuracy of the system and reduce sensitivity of the external disturbances.

ADVATAGES
1. To improve stability of the system.
2. To reduce reliable repeatable performance.

DISADVATAGES
1. Closed loop system is more complex by having one or more feedback paths.
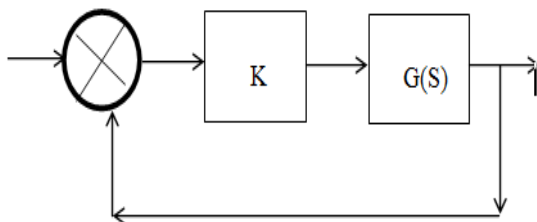
B. PROPORTIONAL CONTROL SYSTEM

Fig2:- proportional control system

In proportional control system act like control effort is proportional to the error. I.e. controller output is proportional to error signal, which is the difference between the set point and process variable.in other word, the output of proportional controller is the multiplication of the error signal and the proportional signal.

ADVATAGES
1) Proportional controller helps in minimize steady state error, so system is more stable.
2) Slow response of the over damped system can be made faster with the help of those controllers.

DISADVATAGES
1) Due to presence of proportional controller we some offset in the system.
2) Due Proportional controller also increases the maximum overshoot of the system.

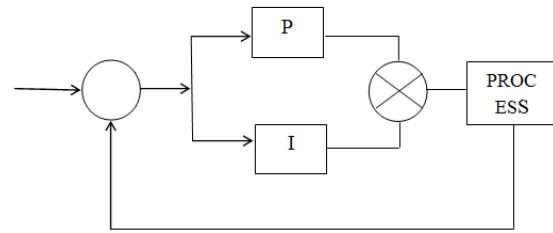### C. PROPORTIONAL-INTEGRAL CONTROL SYSTEM

Fig3:- Proportional-integral control System

In integral control system the control system is act like the control effort is proportional to the integral of the error. The proportional controller is amplifies the error and applies control effort to the system that is proportional to the system. In integral control, control effort is proportional to the integral. In proportional and integral control system the output means to summation of proportional and integral of the error signal.
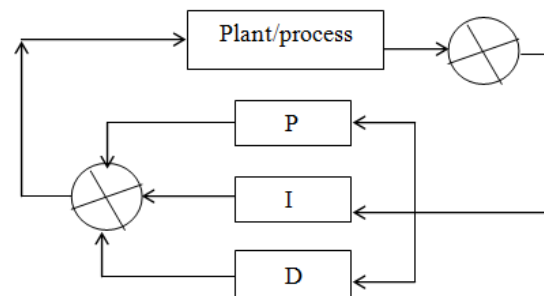
ADVATAGES
1) Due to their ability they can return the controlled variable back to the exact set point following disturbances that's why these are known as reset controller.

DISDVATAGES
1) It tends to make the system unstable because it response slowly towards produced error.

D.PROPORTIONAL-INTEGRAL-DERIVATIVE CONTROL SYSTEM

A PID (proportional-integral-derivative control) controller is control loop feedback mechanism. In PID controller continuously calculates an error value is difference between desired set point and major process variable. In PID controller block diagram as shown in fig above. P is present value of the error for example if error is large and positive. The control output will also large and positive. I past value of error. For example if the current output is not sufficiently strong, error will accumulate over time and controller will respond by applying strong action. D is for the feature value error, based on its current rate of change. A PID controller relies only on the measured .2011process variable not on knowledge on the underlying process. We have to tune three parameter of the model. Tuningcontrol loop is adjustment of control parameter (proportional band/gain, integral gain/reset, derivative gain/rate).to optimum value of the desired control response. Stability is

basic requirement but different systems have different behavior, different application have different requirement. In most of the industries PID controller application is used for controlling temperature, pressure flow.

APPLICATION
1) Furnace temperature control.
2) Neutralization P^H control.
3) Batch temperature control.

ADVANTAGES
1) A PID controller is control system better than P controller, PI controller, PID controller.

DISADVANTAGES
1) In PID controller overshoot correct slowly.

IV.   CONCLUSION

As we discuss controller like P, PI and PID. P controller is not suitable for temperature controller because of offset error. PI controller has no phase advanced means PI controller will not work not for system which is phase lag of 180^0 or more. So that we conclude that PID controller is suitable for the temperature control of reactor.

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