EVALUATION OF EFFECTS OF DIFFERENT TANGENTIAL METHODS ON THE PERFORMANCE OF PID CONTROLLER (LEVEL)

NAME: NUR AMINAH BINTI IDHA YURI

STUDENT ID: 2020835824

SUPERVISOR: AZMI BIN MAHMOOD

SCHOOL OF CHEMICAL ENGINEERING COLLEGE OF ENGINEERING

2023

ABSTRACT

The most common type of controller in the chemical process industries is a proportional, integral, and derivative (PID) controller because it is simple, easy to operate, and successful in operation. The regulation of speed, temperature, flow, pressure, and other process variables can all be controlled by using a PID controller. The purpose of this study is to run an open loop test to obtain a process response curve upon which Response Rate (RR), Dead Time (Td) and Time Constant (Tc) are analyzed to confirm the ideal tangential method for the process control loop system. There are several different methods that are used in the process such as Normal Tangent Method, Reformulated Tangent Method and Two-point Method. The values from the three methods are then calculated using Ziegler Nichols tuning rule to be used for further steps. The main objective of the study is to compare among the three methods that will give the better and desired control performance. Settling time and Integral Absolute Error (IAE) has been used as the criterion for the comparison.

TABLE OF CONTENTS

CHAPTER ONE
BACKGROUND

1.1 Introduction

A PID controller is an instrument used in industrial control applications to control variables such as temperature, flow, pressure, and speed. The most accurate and reliable controllers are known as proportional-integral-derivative (PID) controllers, which use a control loop feedback mechanism to control process variables.

Elmer Sperry created the first design of the PID controller in 1911. However Taylor Instrumental Company (TIC) unveiled the first pneumatic controller with a fully tunable proportional controller in 1933. Control engineers discovered the state error in proportional controllers a few years later, and as long as the error was not zero, they eliminated it by setting the point to some artificial value. TIC created the first PID pneumatic controller with a derivative action in 1940, which minimized overshooting concerns. However, Ziegler and Nichols published tuning criteria in 1942, allowing engineers to finally locate and adjust the appropriate settings of PID controllers. PID controllers are widely used in industrial applications.

The PID controller applies a correction based on proportional, integral, and derivative terms to the error value, E, which is continually determined as the difference between the desired set point, SP, and a measured process variable, PV. Additionally, the controller adjusts the control variable over time in order to decrease error. A process loop using a PID controller would open a control valve to a new value by adding the weighted sum of the control terms. Proportional, integral and derivative are the terms that will be changed in this lab, respectively.

In an open-loop control system the control actions are independent of the desired output, which means that the output is not measured or fed back to the input for comparison. When a controller receives an input command, it generates an actuating signal. This controlling signal is fed into the process to be controlled, resulting in the desired output. Open loop systems, without a feedback system, operate without any checks and balances and are expected to follow its input