EFFECT OF VARIOUS TUNING METHODS TOWARD THE CONTROLLABILITY OF TEMPERATURE CONTROLLER

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ABSTRACT

The ability of Proportional Integral Derivative (PID) controllers to compensate many industrial processes has led to their wide acceptance in industrial application. In this project, a comparison is made for different tuning methods of PID controller to improve the performance of the temperature control. The tuning method that involved in this experiment were Zeigler-Nichols, Cohen-Coon, Chien, Hrones, and Reswick, CHR (1), CHR (2), CHR (3) and CHR (4). To investigate the performance of the tuning, the process at first going through the open loop test. The objective of open loop test is to figure out the value of response rate (RR), dead time (T_d) and time constants (T_c). Then the value of RR, T_d, and T_c is used to calculate the optimum controller setting for every tuning method. The value of PID is used in the load disturbance test to observe the performance every tuning method. Based on the response produced for each tuning method, the most effective tuning method is CHR (1). The method has the highest settling time and rise time which means the response able achieve the set point faster than other tuning method. The rise time and settling time produced from the response is 0.833 minute and 3.333 minute respectively

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CHAPTER 1

INTRODUCTION

1.1 Introduction

Process control is the crucial element in many manufacturing plants. Control in process industries which refers to the regulation or method that used to control processes variables such as temperature, flow, pressure and level. The process can be monitored and manage by measuring the deviation of an existing value from the desired value and after that consequently adjusting the system to reduce the differences (Krishnaswamy, 2011). A good controlling system can help the manufacturing plants reduce its variability in the product by maximizing the quality of the product and increase the efficiency of the system.

Proportional, Integral and Derivative (PID) controllers have been the most important discourse in engineering practice and have a long history in the automatic control field, starting from the beginning of the last century (O'Dwyer, 2006). It is the most widely-used controller in the chemical process industries. Prior it was initially actualized in the pneumatic device but now its uses are extended to analog as well as digital electronics (Priyadarshini and Lather, 2013). PID controller is the most flexible and simple method. The ability of Proportional Integral Derivative (PID) controllers to remunerate many practical industrial processes has prompted to their wide acknowledgment in industrial application.