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STUDY ON THE EFFECTS OF DIFFERENT PROPORTIONAL VALUES ON GAS PRESSURE CONTROL

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ABSTRACT

Gas pressure system is self-regulating process that is fast and noisy. This study is carried out to determine the process characteristics, mode of control and the effects on response curve when three different proportional (P) values are implemented into a gas pressure control system. Reformulated tangent method and Ziegler-Nichols tuning rules are used to determine the process characteristics and mode of control. Both of these methods are done based on the resulting graphical response from conducting open loop test. In addition, the resulting graphical response from load disturbance test is used to analyse the effects of proportional (P) values. As a result, , 0.0355 1/s response rate, 1.3043 s time dead and 32.3478 s time constant are obtained. From the tuning rule, 4.9599 proportional (P) value and 4.3433 s integral (I) value are determined. Lastly, the process took 79.30 s to become stable when an increased proportional (P) value is used, 59.35 s when a decreased value is used and 63 s when there are no changes in proportional (P) value. In conclusion, higher proportional (P) value took longer time for the process to stabilize.

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CHAPTER ONE

INTRODUCTION

1.1 SUMMARY

An automatic process control system is responsible to obtain the desired value of a process when a disturbance occurs. In order to determine what to do to achieve it, a controller will decide it but to know how, that is determine by the control strategy. There are numbers of control strategies available but in this research, only feedback control is investigated where it is performed in an open loop system of gas pressure process. Open loop test and load disturbance test are conducted to analyse the performance of gas pressure controller by simulating it at Process Control Laboratory UiTM Shah Alam using Emerson DeltaV.

1.2 RESEARCH BACKGROUND

Fundamentally, the function of process control system is to affect an operation, either by indicating or adjusting the variables in order to achieve the desired value of the operation (Romagnoli, J. A., & Palazoglu, A., 2006, p. 3). An automatic process control means a control system where the desired value is achieved without using any operator (Smith, C. A., & Corripio, A., 2006, p. 2). The simplest strategy for the automatic process control is by using feedback control (Smith, C. A., & Corripio, A., 2006, p. 310). A controller decides the action needed to achieve the desired value based on the disturbance occurred (Smith, C. A., & Corripio, A., 2006, p. 3).

Tracing back prior the 1940s where most chemical process plants used up many operators in order to manually change valves for control adjustments and installed large tanks as buffers or surge capacities function. Both of this acts used a lot of cost, hence, making it uneconomical during the early 1950s since more developed equipment and processes had be implemented. During this time, feedback controllers were used (Romagnoli, J. A., & Palazoglu, A., 2006, p. 4).