LIQUID FLOW PROCESS SINGLE LOOP FUZZY LOGIC CONTROL AT MODEL WF922

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Thesis submitted in fulfilment of the requirements for the degree of

Bachelor Eng. (Hons) Chemical and Process

FACULTY OF CHEMICAL ENGINEERING

UNIVERSITY TEKNOLOGI MARA

SHAH ALAM

JANUARY 2017

ACKNOWLEDGEMENT

In the name of Allah, the Most Gracious and the Most Merciful. Alhamdulillah, all praises to Allah, for the strengths and His blessing in completing this thesis. Special appreciation goes to my supervisor, Mr. Mohd Aizad Ahmad, for the encouragement, guidance, and useful critiques on this research work. My acknowledgement also goes to all the technicians and office staffs of the Faculty of Chemical Engineering, especially for their guidance and co-operations. Special thanks to my beloved family, my parents, sisters, nieces and nephew, for their love, comfort and support. Despite their distance, they always give words of encouragement in the completion of this project. Last but not least, I want to give my appreciation to all my friends and classmates that helped me throughout the completion of this project. With great pleasure, I am grateful to have them who always willing to lend their help in doing this project and boost my spirit to complete my research.

ABSTRACT

Liquid flow process input and output parameters control system by using Fuzzy Logic Control was investigated in this study. Fuzzy Logic Control has been choose as the control system due to its a robust system, simple construction of parameter conditions, less mathematical equation and calculation involved, and also excellent in handling offsets due to load disturbance. Overall, fuzzy logic control is a good alternate to other control system. Many input parameters can be set in fuzzy logic control system. However, we need only the best input parameter, thus the performance test was applied. In this study, parameters that involved were Error (e), Change of Error (Δe) and Change of Output (Δu). Each parameter was set at different values for each four trials of experiment conducted. The parameters were then used as the input for three setpoint of liquid flow, which at 1.8m^3/hr, 3.5m^3/hr, and 4.2m^3/hr respectively. The manipulated output and trial parameters were set first. The fuzzy logic control tuning parameters and flowrate setpoint were then can be commenced. The controller then was set at Auto mode. After the flowrate was approximately 5% ± to the setpoint, Load Disturbance test was begun. The fuzzy logic historical trend was observed. Load Disturbance Test was conducted at 10% offset from the setpoints mentioned to test the performance of system. The performance of the experiment will be compared by the Settling Time (s), Integral Absolute Error (IAE) (m^2), and Decay Ratio. The performance will be recorded, and the result will be calculated and compared. This can be achieved by conducting experiment on Model WF922 for liquid flow control, located at Pilot Plant, Faculty of Chemical Engineering, Universiti Teknologi MARA, Shah Alam.

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CHAPTER 1

INTRODUCTION

1.1 Research Background

The world of embedded control is experiencing a push into the realm of fuzzy logic. Even household machines are advertised as being intelligent with the help of the built-in fuzzy logic. The popularity of the fuzzy logic is due to its simplicity and effectiveness in solving control problems. (Ferenc Farkas and Sándor Halász, 2006).

Recent applications of fuzzy control in water quality control, automatic train operation systems, nuclear reactor control, fuzzy memory devices and fuzzy computers have pointed a way for an effective utilization of fuzzy control in the context of complex ill-defined processes that can be controlled by a skilled human operator without the knowledge of their underlying dynamics. (C.C. Lee, 1990).

Commercially, fuzzy logic has been used with great success to control machines and consumer products. In the right applications fuzzy logic systems are simple to design, and can be understood and implemented by non-specialist in control theory. (James Vernon, 2004)