UNIVERSITI TEKNOLOGI MARA

INFERENTIAL CONTROL OF A FLASH SEPARATOR FOR ETHYLBENZENE PRODUCTION

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B.Eng (Hons) Chemical

July 2018

ABSTRACT

The research of the project is made based on a process control that implemented on a flash separator which is inferential control system. The control system is applied on a flash separator which run a chemical process of ethylbenzene production. Flash separator is an equipment that used in the process to separate between liquid and vapor. The objectives of this study are to find the dynamic relation between variables in a flash separator and to propose an inferential control system for a flash separator. The main focused of the research is to conduct a simulation study of the control system on flash separator. The purpose of using inferential control system is to determine the composition of a product out from a flash separator. The method used is not directly measured the composition, but by measure the secondary output to get the composition. It is because conventional method has some limitation on getting on-line reading of composition. The composition to be controlled in the process is ethylbenzene. Inferential control system is used to control the composition but by controlling other variables such as inlet temperature and pressure in tank. All the research were done by using simulation software for data collection and analysis. The software used were Aspen HYSYS and MATLAB-Simulink. This simulation software simulated the process to be most likely as the same parameter on real situation. For Aspen HYSYS, it used to get the dynamic relation between variables in the study and simulate the process with real condition while MATLAB-Simulink is used to simulate the control system with the behaviour of the process. Based on the result obtained, the inferential control system is a better alternative in order to solve real process control problem that always occur in process plant. The result shows that the inferential control system is able to control the composition of products bet set point tracking.

ACKNOWLEDGEMENT

First of all, I would like to express my sincere gratitude to my supervisor Madam Zalizawati Binti Abdullah for the continuous support and guidance in every step throughout the process for the Research Project. Not only that, I also want to thank to my Research Project coordinators for the guidelines provided throughout this project was carried out. I take this opportunity to express gratitude to all of the department faculty members for their help and support. My sincere appreciation to my family members who keep supporting during this process. They were always supporting me and encouraging me with their best wishes. Besides that, deepest appreciation to all my friends who assisting me during the process of research project. Last but not least, I would like to thank for those who are participate intentionally or unintentionally helping me throughout this process.

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CHAPTER ONE

INTRODUCTION

1.1   Research Background

When observing a chemical process in a plant, there are various kinds of processes happen. The study of controlling all the process inside the plant is called process control engineering. Process control in chemical engineering is a study that focus on the application of automatic control. The main objective of process control is to maintain or control a process to be at its desired operating conditions, safely and efficiently, while satisfying environmental and product quality requirements. Safety and profitability of a process can be improved by applied a proper process control in a system. Its shows that controlling a plant is not easy because a plant is tend to be difficult to operate because of its complexity and highly integrated process. Control engineering plays an important part in industrial plant in controlling the process always in desired condition (Marumo & Sebusang, 2008).

Process control in chemical engineering is a combination of control engineering and chemical engineering disciplines that applied in any process industry for control or maintain the level of production consistency, economy and safety which hard to be achieved by manually control by human. This engineering discipline had been implemented widely in industries such as oil refining, pulp and paper manufacturing, chemical processing and power generating plant. The application of process control engineering can range from the temperature, level, pressure and etc.

In process control study, the conventional type of process control usually used is PID control system. However, the conventional control system which has long-dead time process and automatically tune the parameter of a dynamic process. Generally, the inferential control system is a control system implemented to improve the conventional control system. The term of inferential control is used to measure the composition using measured variables. Basically, inferential control system is a method that controls the composition of product by on-line composition control compared to conventional method which needs a long dead time for laboratory analysis or needs to mount an analyser sensor on the system where the sensor is quite expensive. The principle of inferential control system is measure or predict the variables that can directly measure