INTEGRATION OF STATISTICAL PROCESS CONTROL AND ENGINEERING PROCESS CONTROL IN REACTOR SYSTEM

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ABSTRACT

The purpose of this study is to investigate the integration of Statistical Process Control and Engineering Process Control in batch reactor system. The Shewhart control chart, Cumulative Sum(CUSUM) and Exponential Moving Average (EMWA) control chart have been aproached to evaluate the best and effective control to monitor the batch reactor.Integration of Statistical Process Control (SPC) and Engineering Process Control(EPC) in the system for the purposed to monitoring and adjusting the disturbance and fault that cause variation of system. This technique can help to improve process productivity and product quality. Batch reactor have a bigger issue in controlling the temperature and also lack of on-line monitoring and controlling worst the problem. The batch esterification reactor system used as case study. The feedback PID controller was installed in the reactor system to make the adjustment of the process response to avoid the process drift away from the target value which is 310K. The data of the process that simulate from MATLAB was extracted, and calculated to be monitor. This monitoring process using different type of control chart; Shewhart, Cumulative Sum and Exponential Moving Average control chart by using Minitab software. The experimental result, proved that CUSUM and EMWA chart is more effective than Shewhart because can quickly detecting mean shift that are small relative to measurement system.

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CHAPTER 1

INTRODUCTION

1. Summary

Statistical Process Control (SPC) is being used along with feedback control system also known as Engineering Process Control (EPC) in improve the product quality in industrial process. In basic, SPC focus on to determine whether assignable causes exits in manufacturing process through the analyzing the quality characteristics data from process output. In the contrary, EPC is adjust the process variable in order to keep the output on set point or target. The integration of SPC and EPC will produce efficient tool for process variation reduction and improve the final product quality by creating necessary condition. In most literature, researches more focus on integrated of SPC and EPC into continuous process. A little attention in integrated SPC and EPC in batch system process especially in batch reactor. The main problem of batch reactor system is temperature and it is very difficult to control. Moreover, the lack of online monitoring (real time data) on the monitoring and controlling of the batch reactor system(Huzmezan, Gough, & Kovac, 2002). This research project is focus on integrated of SPC and EPC in batch process and batch esterification reactor as a case studies. The other objective was to investigate the application of different type of SPC control chart for batch processes. The most common chart used are Shewhart, Cumulative Sum (CUSUM) an Exponential Moving Average (EMWA). The integrated approach by SPC mechanism act as trigger to EPC control scheme in the system.