

**FAULT DETECTION, ACCOMODATION AND ISOLATION
FOR PAPER MILL INDUSTRIAL CONTROL**

PREM KUMAR A/L APASAMY

UNIVERSITI TEKNOLOGI MALAYSIA

DEDICATION

For the loved Father and Mother

ACKNOWLEDGEMENT

My special thanks to Dr. Mohd Fauzi Othman for this guide and supervise along this research study.

Special appreciation to Malaysian Newsprints Industries Sdn .Bhd (Maintenance Department) stuffs for the cooperation through out the research.

And also not forget those who directly and indirectly help success this research program.

ABSTRAK

Kerosakan instrumen di industri adalah gangguan untuk pengeluaran industri. In bukan sahaja gangguan kepada pengeluaran malah kepada pembaikpulihan. Gangguan in menyebabkan kehilangan pengeluaran and masa pengeluaran. Industri sedang berkembang pesat dan teknik baru diperlukan untuk mengesan kerosakan instrumen lebih awal sebelum ia rosak and mengganggu pengeluaran industri. Teknik tradisional iaitu 'Predictive Maintenance' dan 'Run to Fail' tidak mempunyai ruang untuk peningkatan dari segi pengesanan kerosakan instrumen .Banyak kajian telah dilakukan dalam topik pengesanan kerosakan instrumen dan teknik baru Kecerdikan Palsuan (Artificial Intelligent) digunakan dalam pengesanan kerosakan instrumen. Dengan menggunakan parameter dan pemalar dari prosess dan instrumen, AI boleh di bina dan digunakan untuk melihat kebolehpercayaan teknik AI dalam pengesanan kerosakan instrumen. Kebolehan pengesanan teknik AI digunakan untuk mengukur kebolehan pengesanan kerosakan instrumen.

ABSTRACT

Instrument fault in industries is an interruption to industries production and maintenance. Its cause loses of production and time .As industries growing faster and rapidly, there are a need of method to detect the fault of instrument before its can disturb the production of industries. Conventional technique such as Predictive Maintenance and Run to Fail not did not give much room in term of predictability of instrument fault. Many study and research done on the fault detection technique and new technique Artificial Intelligent technique (AI) application in fault detection be come one of major studies in research. Using the parameter and variable from process and instruments, AI can be constructed and applied to view the reliability of the AI technique in the fault detection method. The predictability of AI will be measure as performance indicator of fault detection.

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CHAPTER 1

INTRODUCTION

1.0 Problem Statement

Recent development shows advancement in maintenance tool for industries growth very fast. Many tool developed to help maintenance to carry out corrective maintenance and the preventive maintenance. This concept of corrective maintenance and preventive maintenance is highly used to make sure the instruments used in production industry working well during production. The next level need to be seen in this field to enable the instrument reliability during production is high. One of current research that used is the use of AI technique to identify the failing instrument before its disturbed the production.

This research regarding the application of Neuro fuzzy in fault detection of fault in a paper mill process control. This research is to study and develop an early fault detection system of instrument. The instrument selected for this research is servo valve due to its critically use in paper mill.

Conventional method is the preventive maintenance where checklist daily is used to see the functionality of the instrument in field. But the limitation

to this method is that analysis method is not good enough to see the future of the instrument s condition.

The Neuro Fuzzy is an advance technique to analysis the instrument condition and capable to view the future of this instrument. Data available from servo valve itself output voltage, current & pressure, flow rate .Its comparable with indirect pressure measure system (Darwin system). All captured data will be applied in Neuro fuzzy for fault detection. Other parameter such as machine speed, product grade will be taken into account. Using this data the fault detection using Neuro Fuzzy can be develop and help the industrial to make production more reliable.

1.1 Objective

The objective of this research is to study servo valve fault occur in application in paper machine. Using the information from plant, observe the pattern and symptoms of failure in servo valve system in act. And study the method to apply the fault detection method in actual plant, By understand the changes of parameter in process and its effect in servo valve system in real application and the change that made by servo valve fault, servo valve fault detection using the Artificial Intellegent can be constructed .The constructed fault detection system will be analysis the performances of it and if given opportunity will be tested in lab or simulation.

1.2 Scope Of Study

The scope of research covers wide area of mechanical, electric-electronic, and instrument. Using proper guide, this can be narrow down to specific range of study. Study the servo valve system in paper mill application in term of mechanically ,electrically and process control .The literature studied is to understand the concept of the fault detection in process control and studied the proposed method for the fault detection . All the data regarding the servo valve relevant to study collected and analyzed. Analysis the related data and check the suitable Neuro Fuzzy method to be use in research. Develop the AI algorithm for the Neuro Fuzzy method and tested by simulation .

1.3 Thesis Outline

1.3.1 Chapter 1 – Introduction

In this chapter the introduction to on the fault detection concept in industries. Also elaborated the problem that exist in current industries instrument maintenance area. The objective of the research and the scope of study involve in this research.

1.3.2 Chapter 2 – Fault Detection Of Servo Valve In Paper Machine

Here the overview of process area with instrument involve in this research will be introduced. The problem – effect involve process and instrument will be explain in detail.

1.3.3 Chapter 3 – Literature Review

Here the literature, journal and manual that were studied to guide this research done. There're some literature that involve indirectly with this research, which give useful information for research.

1.3.4 Chapter 4 – Methodology

In this chapter, the step that have take to complete this research is elaborated. The introduction to the Artificial Intellegent technique that going to be constructed will be explained. And how this Artificial Intellegent technique is implement in Mat Lab will be explained. The construction of the Artificial Intellegent technique will be shown step by step.

1.3.5 Chapter 5 – Result

In this chapter the output of the constructed Fuzzy Logic, Neuro – Fuzzy and Neuro Network will be shown and explained .The design will be simulated in Mat Lab software and the output of simulation will be shown here.

1.3.6 Chapter 6 – Conclusion

Here the overall explanations of the research given. What have been done throughout the research and what has been gain by this research also elaborated in this part.