



**EVALUATION OF DESIGN PARAMETERS FOR AIR CYCLONE  
SYSTEM IN PALM OIL MILL**

**ABRAR BIN HARON  
(2001194753)**

A thesis submitted in partial fulfilment of the requirements for the award of  
Bachelor of Eng. (Hons) in Mechanical Engineering.

**Faculty of Mechanical Engineering  
Universiti Teknologi MARA (UiTM)  
40 450 Shah Alam  
Selangor**

**OCTOBER 2004**

## **ACKNOWLEDGEMENT**

First of all, we would like to thank to Allah S.W.T due to our success in completing our final year thesis even though there a lot of task that we have to face in completing the new design for our air cyclone system.

We would like to express our sincere gratitude and appreciation to our advisor, Prof Madya Ir. Mohd Khalid Bin Hassan who had initiated and supervised the completion of this project. With his motivation and opinion given, we are able to excess more knowledge and gain valuable experience which is used to complete this final project successfully.

Also not forgotten, our thanks to En. Abd. Aziz b. Jidon, Director of AME Sdn. Bhd and also En. Mohd. Faizar b. Abd. Rahman, Quality and Environment engineer of FELDA Palm Oil Industries Sdn. Bhd., that had shared their valuable experience involving this field with us. Lastly, we also like to say thanks to those involved in supporting us directly or indirectly, especially our family and friends.

## ABSTRACT

There are many types of function or task that can be performed by an air cyclone system, but the one that we are trying to evaluate and improve is the one that operates in the palm oil mill where its function is to separate the fibre from the fibre-nut mixture. In the first chapter, we will brief you on how the system in palm oil mill works where mainly is to extract oil from the palm oil fruits. There are two procedures of extracting the oil, one is getting the oil from fibre and the second one is from the nut itself. The air cyclone system is used at the last part of the first procedure where the efficiency of it is measured by the amount of fibre collected rather than sucking the nut together with the fibre in it.

In the next chapter, three major components that are really the heart of the system will be specified all of its ability. From here we will introduce you the depericarper column, the air cyclone and the centrifugal fan. You will understand on how do these component effects on the system if its design is being tempered. The air cyclone and the centrifugal fan has its own standard where to change or redesign the parameter of these component, all the factors tabulated have to be considered and to pick the right standard is mostly essential. The depericarper column is custom made. Engineers will only be considering on putting the right parameter of the area of the column just to get the right effect on the separating speed.

Chapter 4 will be considering on the analysis for the selection of what we have choose or design. Referring to standard given, we will determine the most efficient design and we will try to integrate all three components so that the design is suitable and stable to be used. In Chapter 5, we are discussing on the result that we has achieved during the analysis.

## TABLE OF CONTENT

CONTENTS	PAGE
ACKNOWLEDGEMENT	i
ABSTRACT	ii
LIST OF TABLE	vi
LIST OF FIGURE	vii
LIST OF ABBREVIATIONS	ix
<b>CHAPTER 1 INTRODUCTION</b>	
1.1 Introduction	1
1.2 Objective	3
1.3 Significant of Project	3
1.4 Methodology	4
<b>CHAPTER 2 LITERATURE REVIEW</b>	
2.1 Literature Survey	5
2.1.1 Early Stage : Extracting Oil Form Fibre	6
2.1.2 Second Stage: Extracting Oil From Kernel	11
2.2 Air Cyclone System	15
<b>CHAPTER 3 AIR CYCLONE SYSTEM</b>	
3.1 Depericarper Column	18
3.1.1 Introduction	18
3.1.2 Depericarper Column	21

## **CHAPTER ONE**

### **INTRODUCTION**

#### **1.1 Introduction**

Nowadays, a lot of industries uses vary of equipment that involve in separating particles from air, gas or fluids. The studies that had been made shows a lot of improvement on separating different sizes of particle that is from particles that can be seen with our naked eye, till the smallest one that has the size as small as 5 micron. Even now gas also can be separated with other gasses. One of the most famous systems that had been used widely in the industries is the cyclone system. From air cyclones to the hydrocyclones, a lot of advantages had been achieved by using this type of system. But to play around with system that involved with turbulence, vortex or swirling action is something that human cannot control 100%. There will be unbalance in the performance of the cyclone. Only now with a lot of researches and experiments that had been conducted, people are able to produce a tabulated data that now is set as a standard reference. The table mentioned will be described later in this report.

Our focus now will be on the air cyclone system that had been used in the palm oil industries. The authors had visited a palm oil mill and a consultancy that had the experience designing this system to obtain the average data for the efficiency and performance of the air cyclone that they are using. Now, the authors will evaluate the existing design to see further effect on the performance of the system