UNIVERSITI TEKNOLOGI MARA

PRODUCT DESIGN ON A MINI DRUM COFFEE ROASTER

MUHAMMAD AIMAN BIN MOHD ROZI

Diploma

December 2023

ABSTRACT

Coffee roasting has been an integral part of coffee culture for centuries, and the process of roasting coffee has undergone significant changes over time. The coffee roasting technology continued to improve during the 20th century. They started roasting beans using wood-fired roasting and roasting beans in a pan. But nowadays a drum coffee roaster is used because it is easier and more efficient. This project will aim to design a user-friendly mini drum coffee roaster that can be used by all sort of people including the elderly and the youngsters. Besides, this project aims to fabricate a mini drum coffee roaster that will fulfil the desired taste of every sort of people especially the coffee lovers as anyone from all sorts of ages love to drinks coffee. As for the method, a pilot survey has been conducted to gain insight and understand the requirement for the project. The product design specification phase involved using the House of Quality, Pugh Table, Morphological Table, and Failure Modes and Effect Analysis. As for the result, the prototype have been improved in roasting control to provide a better control over the roasting process. The prototype also have been fabricated with an enhanced safety feature.

ACKNOWLEDGEMENT

Firstly, I wish to thank God for giving me the opportunity to embark on my diploma and for completing this long and challenging journey successfully. My gratitude and thanks go to my supervisor, Sir Matzaini bin Katon.

Finally, this dissertation is dedicated to my father and mother for the vision and determination to educate me. This piece of victory is dedicated to both of parents. Alhamdulillah's.

TABLE OF CONTENTS

		Page
CONFIRMATION BY SUPERVISOR		**ii**
AUTHOR'S DECLARATION		**iii**
ABSTRACT		**iv**
ACKNOWLEDGEMENT		**v**
TABLE OF CONTENTS		**vi**
LIST OF TABLES		**ix**
LIST OF FIGURES		**x**
LIST OF ABBREVIATIONS		**xi**
CHAPTER ONE : INTRODUCTION		**1**
1.1	Background of Study	1
1.2	Problem Statement	2
1.3	Objectives	2
1.4	Scope of Work	3
1.5	Significance of study.	4
CHAPTER TWO : LITERATURE REVIEW		**5**
2.1	Introduction to Mini Drum Coffee Roaster	5
2.2	Product Dissection of Mini Drum Coffee Roaster	6
	2.2.1 Mini Drum Coffee Roaster operational process?	6
	2.2.2 Mechanical part for mini drum coffee roasters	7
	2.2.3 Condition for roaster to function well.	8
	2.2.4 Material used to make the roaster.	9
2.3	Patent study of "Mini Drum Coffee Roaster"	10
2.4	Benchmarking of a "Mini Drum Coffee Roaster"	20
2.5	Conclusion	21
CHAPTER THREE : METHODOLOGY		**22**
3.1	Flow Chart	22

CHAPTER FOUR : RESULTS AND DISCUSSION **23**

4.1 Preliminary Result. 23

4.1.1 Customer Requirements. 23

4.1.2 Survey 25

4.1.3 Interview 26

4.1.4 House of Quality 28

4.2 Product Design Specification 29

4.3 Physical Decomposition 30

4.4 Functional Decomposition 31

4.5 Morphological Table for "Drum Coffee Roaster" 32

4.6 Pugh Table 33

4.6.1 Concept 1 34

4.6.2 Concept 2 35

4.6.3 Concept 3 36

4.6.4 Concept 4 37

4.6.5 Concept 5 38

4.6.6 Conclusion for all 5 concepts 38

4.7 Product Architecture 39

4.8 Rough Geometry Layout 40

4.9 Configuration Design 40

4.10 Parametric Design 41

4.10.1 Failure Mode and Effect Analysis 42

4.10.2 Engineering Analysis 42

4.11 Drawing 44

4.11.1 Detail Drawing 44

4.11.2 Assembly Drawing 45

4.11.3 Exploded View Drawing 46

4.12 Bill of Materials 47

CHAPTER FIVE : CONCLUSION AND RECOMMENDATIONS **48**

5.1 Conclusions 48

5.2 Recommendations 50