EM110 DIPLOMA OF MECHANICAL ENGINEERING FACULTY OF MECHANICAL ENGINEERING UITM CAWANGAN JOHOR, PASIR GUDANG CAMPUS

# MEC332 MECHANICAL ENGINEERING DESIGN

# **PROJECT:**

**THORNIAN SPLIT-ER** 

# SUPERVISOR'S NAME:

MOHD NOOR HALMY AB LATIF

# LECTURER'S NAME:

AHMAD NAJMIE BIN RUSLI

# **GROUP:**

## J4EM1105B

NO.	NAME	STUDENT ID
1	MUHAMAD ILMAN ARIF BIN HASHIM	2017254128
2	AZRAYQAL FIRDAUS BIN ZULKEFLEE	2017220458
3	MOHAMAD SYAFIQ IKMAL BIN ABD RASID	2017228472
4	MOHAMAD IZZUDDIN BIN IBRAHIM	2017253856

Sep-Jan 2020

## TABLE OF CONTENTS

NO.	TOPIC	PAGE
1	ABSTRACT	1
2	CHAPTER 1: INTRODUCTION	2
	• 1.1 BACKGROUND	2
	1.2 PROBLEM STATEMENT	2 – 5
	1.3 OBJECTIVE	6
	1.4 SIGNIFICANCE OF THE PROJECT	6
	1.5 PROJECT MANAGEMENT	6
3	CHAPTER 2: DESIGN PROBLEM DEFINITION	7
	2.1 MARKET ANALYSIS	7
	- 2.1.1 TARGETED MARKET AND ESTIMATION OF MARKET	7 – 8
	SIZE	
	- 2.1.2 CUSTOMER NEEDS AND IDENTIFICATION	8 – 9
	2.2 COMPETITIVE BENCHMARKING PRODUCT	9 – 10
	2.3 FINAL PRODUCT DESIGN SPECIFICATION	10 – 11
4	CHAPTER 3: CONCEPT GENERATION AND SELECTION	12
	3.1 FEASIBLE CONCEPTS	12
	3.2 MORPHOLOGICAL CHART	12 – 14
	- 3.2.1 CONCEPT 1	14 – 15
	- 3.2.2 CONCEPT 2	15 – 16
	- 3.2.3 CONCEPT 3	16
	3.3 SELECTION OF FINAL CONCEPT	17
	- 3.3.1 PUGH CHART	17
5	CHAPTER 4: EMBODIMENT DESIGN	18
	4.1 PRODUCT ARCHITECTURE	18
	4.2 CONFIGURATION DESIGN	19
	- 4.2.1 LIST OF PARTS	19
	- 4.2.2 DETAILS STANDARD PART SELECTION	20 – 21
	• 4.3 PARAMETIC DESIGN FOR CUSTOM PARTS	22
6	CHAPTER 5: DETAIL DESIGN	23
	5.1 ENGINEERING RAWING	23

	- 5.1.1 DETAIL DRAWINGS OF MANUFACTURED PARTS	23 – 33
	- 5.1.2 ASSEMBLY DRAWINGS	34
	- 5.1.3 EXPLODED DRAWINGS	35
	- 5.1.4 BILL OF MATERIAL	36 – 38
	5.2 COSTING EVALUATION	39
	- 5.2.1 BREAK EVEN ANALYSIS	39
7	CHAPTER 6: PROTOTYPING AND TESTING	40
	6.1 FABRICATION PROCESS	40
	- 6.1.1 FABRICATION OF MAIN STRUCTURE OF PROTOTYPE	40
	<ul> <li>6.1.1.1 CUTTING PROCESS</li> </ul>	40
	<ul> <li>6.1.1.2 DRILLING PROCESS</li> </ul>	41
	<ul> <li>6.1.1.3 WELDING PROCESS</li> </ul>	41
	6.2 TESTING OF DESIGN: THEORETICAL CALCULATION AND	42
	SIMULATIONS	
	- 6.2.1 SIMULATIONS OF POWER SCREW	42
	<ul> <li>6.2.1.1 DISPLACEMENT ANALYSIS</li> </ul>	42
	<ul> <li>6.2.1.2 STRAIN ANALYSIS</li> </ul>	42
	<ul> <li>6.2.1.3 STRESS ANALYSIS</li> </ul>	43
	<ul> <li>6.2.1.4 THEORETICAL CALCULATION</li> </ul>	43
	6.3 RESULTS AND DISCUSSIONS	44
8	CHAPTER 7: CONCLUSION AND RECOMMENDATION	45
	7.1 CONCLUSION ON DESIGNED PRODUCT	45 – 46
	7.2 FUTURE WORKS	46
9	REFERENCES	47

#### ABSTRACT

Thornian Split-er is an innovation prototype that was inspired by interest our community that really love durian. The purpose of this creation to improve already tool in market that use to split a durian become more lightweight, portable and affordable value. This prototype will operate using mechanical system that use tripod mechanism as the main system and be support with power screw and crank. Besides that, the prototype will be design with a few improvements from already tool in a market that will lightweight, portable and affordable value. These type of prototype does not been seen in the market yet. In studying our design, we have made some online survey using google form among the students of UiTM Pasir Gudang, our family and friend. Most of the responder support our ideas about this product and agree that this product is important and have its own commercial value. We hope that this will made a huge impact as it will help the durian seller to save their time and energy when they split a durian. By using this product, we hope the productivity will increase since the aim of the product is to make innovation from already tool in market that will more efficient and friendly-user.

### **CHAPTER 1: INTRODUCTION**

#### **1.1 BACKGROUND**

Durian is a fruit that requires specific way to split it open. There are only two known ways to split it open. One of it is by using a machete or durian. People need to hold the durian in placeby their hands, then push the machete or knife at the crease of the durian to split it open. Thismethod require a lot of time and energy, especially for novices. Not to mention, it is dangeroustoo.

The second method is by using a specific tool. Based on our research, there are veryfew tools exist in the market. All of them shares the same characteristics – heavy, large and expensive. It is to no surprise that it wasn't very well known by the community.

One problem that is known throughout the community is that the majority doesn't knowhow to split the durian open. Only fruit sellers and a very low percentage of the community knows the howto.

This is where our product steps in. Our product is one of innovation technology to helppeople to split a durian.