UNIVERSITI MALAYSIA PAHANG

BORANG PENGESAHAN STATUS TESIS ◆

JUDUL: DESIGN AND DEVELOPMENT OF HANDY DISC LOOSE COCONUT PALM COLLECTOR

SESI PENGAJIAN: 2012/2013

Saya, **MUHAMAD KHAIRUL ANUAR BIN SHAHARUDDIN (MB11021)**

mengaku membenarkan tesis Projek Tahun Akhir ini disimpan di perpustakaan dengan syarat-syarat kegunaan seperti berikut:

1. Tesis ini adalah hakmilik Universiti Malaysia Pahang (UMP).
2. Perpustakaan dibenarkan membuat salinan untuk tujuan pengajian sahaja.
3. Perpustakaan dibenarkan membuat salinan tesis ini sebagai bahan pertukaran antara institusi pengajian tinggi.
4. **Sila tandakan (√)

☐	**SULIT**	(Mengandungi maklumat yang berdarjah keselamatan atau kepentingan Malaysia seperti yang termaktub di dalam AKTA RAHSIA RASMI 1972)
☐	**TERHAD**	(Mengandungi maklumat TERHAD yang telah ditentukan oleh organisasi / badan di mana penyelidikan dijalankan)
√	**TIDAK TERHAD**	

Disahkan oleh:

_____ (TANDATANGAN PENULIS)

_____ (TANDATANGAN PENYELIA)

Alamat Tetap:

NO.119 FELDA CHINI 05
26690 PEKAN,
PAHANG DARUL MAKMUR
Tarikh:

MR. NASRUL AZUAN BIN ALANG

Tarikh:

CATATAN: * Potong yang tidak berkenaan.

** Jika tesis ini SULIT atau TERHAD, sila lampirkan surat daripada pihak berkuasa/organisasi berkenaan dengan menyatakan sekali tempoh tesis ini perlu dikelaskan sebagai SULIT atau TERHAD.

◆ Tesis dimaksudkan sebagai tesis bagi Diploma secara penyelidikan atau disertai bagi pengajian secara kerja kursus.

DESIGN AND FABRICATION OF HANDY DISC LOOSE COCONUT PALM COLLECTOR

MUHAMAD KHAIRUL ANUAR BIN SHAHARUDDIN

Report submitted in partial fulfillment of the requirements

for the award of

Diploma of Mechanical Engineering

Faculty of Mechanical Engineering

UNIVERSITI MALAYSIA PAHANG

JUNE 2013

SUPERVISOR'S DECLARATION

I hereby declare that I have checked this project and in my opinion, this project is adequate in terms of scope and quality for the award of the Diploma of Mechanical Engineering.

Signature :
Name : MR. NASRUL AZUAN BIN ALANG
Position : LECTURER
Date :

STUDENT'S DECLARATION

I hereby declare that the work in this thesis is my own except for quotations and summaries which have been duly acknowledged. The thesis has not been accepted for any degree and is not concurrently submitted for award of other degree.

Signature :
Name : MUHAMAD KHAIRUL ANUAR BIN SHAHARUDDIN
Id Number : MB11021
Date :

I specially dedicate to my beloved parents
(Shaharuddin Bin Itam and Latifah Binti Kassim), my siblings,
My supervisor and those who have guided
And motivated me for this project

ACKNOWLEDGEMENT

First of all, I want to say praise to Allah for His help and guidance that I am able to complete the task of the Final Year Project. I am thankful and grateful to my supervisor, Mr Nasrul azuan Bin Alang for his advice and knowledge that he shared in the completion of this project. I appreciate his help for me while I am doing the Final Year Project from beginning until this Final Year Project was finished.

Moreover, I also would like to my parents, Shaharuddin Bin Itam (father) and Latifah Binti Kassim (mother) that have gave me support from beginning until the end. I also be grateful to them for their love and sacrifice that they had for me and throughout my life and their support for me in all my activities that I have done.

By doing so, I would like also thanks to all my friend that have been really helpful to give their ideas and physical from starting until the end this Final Year Project. Lastly, I also wanted to the other peoples that have directly or indirectly help in the completion of the Final Year Project. I sincerely appreciate all their help. Thank you.

ABSTRACT

The oil palm is a tropical plant that grows in warm climates at altitudes below 500 meters above sea level. It comes from the Gulf of Guinea in West Africa, which explains its scientific name, Elaeis guineensis Jacq. And its popular name, the African oil palm. At the beginning, the oil palm plant grows in the wild and later was developed into an agricultural crop. It was introduced to Malaysia by the British in early 1870's as an ornamental plant. The first commercial planting took place in Tennamaran Estate in Selangor on 1917, laying the foundations for the vast oil palm plantations and the palm oil industry in Malaysia. Malaysia is one of the largest producers and exporters of palm oil in the world, accounting for 11% of the world's oil and fats production and 27% of export trade of oils and fats. The palm oil is produced from the fruit of the oil palm tree. It has been used as a food source for thousands of years in Asia and Africa, and it has many non-food uses as well. The palm oil is good on frying and baking. The palm oil is stable and will not break down at high temperatures, so it making ideal for frying and baking. The palm oil is also used to make shortenings, margarines, candies, chocolate, condensed milk, sauces and most important the palm oil is good in cooking oil. Nevertheless, the palm oil is also used to make cosmetics, soaps, candles and detergents. It is also used as lubricant for food manufacturing machinery. Besides, the petroleum, plastics, printing and textile industries all commonly use palm oil. Other than that, palm oil is used to make a sustainable, environmentally friendly fuel for automobiles and machines. The biodiesel fuel becomes more popular in the world. The Colombia country is the one of its major producers.

ABSTRAK

Pokak kelapa sawit adalah tumbuhan tropikal yang membesar dalam cuaca yang panas dan lembap pada altitude 500 meter diatas paras laut. Pokok kelapa sawit berasal dari Gulf of Guinea yang terletak di barat Africa, nama saintifik bagi pokok kelapa sawit ialah Elaeis guineensis Jacq. dan nama terkenalnya adalah pokok kelapa sawit Afrika. Pada mulanya pokok kelapa sawit membesar secara meliar, kemudian ia dijadikan tanaman agrikultur. Pokok kelapa sawit diperkenalkan di Malaysia oleh British pada awal tahun 1870 sebagai tanaman hiasan. Tanaman secara komersial yang pertama telah diadakan adalah di Tennamaran Estet yang terletak di Selangor pada tahun 1917, dan diasaskan secara besar-besaran dan industry minyak kelapa sawit di Malaysia. Malaysia merupakan salah sebuah negara pengeluar dan pengeksport terbeasar minyak kelapa sawit terbesar di dunia iaitu 11% adalah penghasilan minyak dan lemak manakala 27% lagi adalah perdagangan eksport. Minyak kelapa sawit dihasilkan daripada buah kelapa sawit. Ia telah dijadikan sebagai sumber makanan untuk beribu sebelum ini tahun di Asia dan Afrika, dan ia juga boleh dijadikan sebagai bukan sumber makanan. Minyak kelapa sawit bagus digunakan untuk menggoreng dan membakar. Minyak kelapa sawit adalah stabil dan tahan untuk suhu yang tinggi,. Oleh itu, minyak sawit sesuai untuk menggoreng dan dibakar. Minyak sawit juga digunakan untuk penghasilan gula-gula, marjerin, coklat dan paling penting ia digunakan sebagai minyak masak. Selain itu, minyak kelapa sawit sesuai digunakan sebagai bahan dalam produk kosmetik, sabun dan lilin. Ia juga digunakan sebagai minyak pelincir dalam mesin pembuatan makanan. Tambahan pula, plastik, cat dan barangan tekstil kebiasaannya menggunakan minyak sawit. Minyak kelapa sawit juga digunakan sebagai minyak mesra alam untuk menjana kenderaan dan mesin. Penghasilan biodiesel semakin terkenal di mata dunia. Negara Colombia adalah salah satu pengeluar terbesar.

TABLE OF CONTENT

		Pages
SUPERVISOR'S DECLARATION		ii
STUDENT'S DECLARATION		iii
DEDICATION		iv
ACKNOWLEDGEMENT		v
ABSTRACT		vi
ABSTAK		vii
TABLE OF CONTENT		viii
LIST OF TABLES		x
LIST OF FIGURES		x
CHAPTER 1	**INTRODUCTION**	
1.1	Project Background	1
1.2	Problems Statements	2
1.3	Objective	2
1.4	Project Scoop	2
CHAPTER 2	**LITERATURE REVIEW**	
2.1	Introduction	3
2.2	Current Method	
2.2.1	Collecting by Using Hand	4
2.2.2	Using Scoop and Basket	6
2.2.3	Using Rake	8
2.3	Summary	9

CHAPTER 3 METHADOLOGY

3.1 Introduction 10

3.2 Flow chart 11

3.3 Conceptual Design

3.3.1 The First Concept 12
3.3.2 The Second Concept 13
3.3.3 The Third Concept 14
3.3.3 The Fourth Concept 15

3.4 Concept Evaluation 15

3.5 Chosen the Finalize Concept 16

3.6 Material Selection 17

3.7 List Of Material 21

3.8 Fabrication

3.8.1 Measuring and Marking Process 22
3.8.2 Cutting Process 23
3.8.3 Drilling Process 24
3.8.4 Finishing 26

3.9 Summary 27

CHAPTER 4 RESULT AND DISCUSSION

4.1 Introduction 28

4.2 Final Product

4.2.1 Overview Product 29
4.2.2 The Stick 29
4.2.3 The Collector 30

4.3 Testing 31

4.4 Results 32

4.5 Problems

4.5.1 Problems Faced During Progress The Project 36
4.5.2 Problems Faced During Testing The Product 37

CHAPTER 5 CONCLUSION

5.1 Introduction 38
5.3 Recommendation 38
5.4 Conclusion 39
APPENDICES 42
REFERENCES 46

LIST OF TABLES.

Table No.	Title	Page
3.2	Gantt chart	41
3.3	Concept evaluation	16
3.6.1	Finalize concept	17
3.7	List of materials	21

LIST OF FIGURES

Figure No.	Title	Page
2.1	The oil palm obtained	5
2.2.	Collecting by using hand	5
2.3	The lubricant container usually used	7
2.4	Collect by using scoop and basket	7
2.5	Example of rake use	8
3.1	Flow chart for the Final Year Project	11
3.2	The first concept	12
3.3	The second concept	13
3.4	The third concept	14
3.5	The fourth concept	15
3.6	Mop stick holder	17
3.7	Section that can move upward and downward	18
3.8	Bolt, nut and washer	18

3.9	Round hollow steel	19
3.10	Clear Perspex and nails	19
3.11	Wire	20
3.12	Hard plastics	20
3.13	Measuring and marking process	22
3.14	Saw	23
3.15	Scissor	24
3.16	Plier	24
3.17	Drill machine	25
3.18	Hand driller	25
3.19	File	26
3.20	Spray paint	26
4.1	Final product	29
4.2	The stick holder	30
4.3	The collector	31
4.4	Photo of the testing product at coconut palm farm	32
4.5	The loose fruit scatter on the ground	33
4.6	The Handy Disc Coconut Oil Palm Collector	33
4.7	Collecting the loose fruit	34
4.8	The loose fruit stick on the nails	34
4.9	Moving the loose fruit into the gunny	35
4.10	The loose fruit already have been removing	35

CHAPTER 1

INTRODUCTION

1.1 PROJECT BACKGROUND

Every bunch of cutting oil palm fruit will cause at least 5% fruit fall separated on the land. This oil palm loose fruit usually will collect by using hand or rake before put it into sack or container. This conventional method need the workers to sit squatting or bow. This way the workers will faced sick back problem. Nevertheless, the production of the collecting just a few about 200 kg. Besides, the using of rake the production of collecting was about 300 kg, but there were mixed with rubbish. The average weight of rubbish was about 50% with the weight of loose fruit.

From the research by Malaysian Palm Oil Council (MPOB), the loose fruit was distributing about 50% from the total percentage of oil from the bunch of coconut palm. Therefore, if the loose fruit was not collect it will reduce the rate oil production. To prevent this happen, the designed and developed a kind of product that will solve the problem as it will collect the loose fruit. This product named Handy Disc Loose Coconut Palm Collector.

The added portability features like light weight to this product that will make the workers easy to carry it to everywhere due to the surface of land at the oil palm plantation. Besides, this product just only used non-permanent joint. By this, it was easy to maintenance. The factor of storage was also been consider to help the workers store it by no need use wide space.

1.2 PROBLEM STATEMENT

At this time the workers still using the conventional method. This is because there were no specific tools that use in widely to collect the coconut oil palm loose fruit. Besides, the conventional method was take a long time to collect the loose fruit. By this conventional also cause the workers always sick back by collect the loose fruit in a long time. Nevertheless, the using of hand to collect the loose fruit will expose to danger. This because we do not know what have on the land.

1.3 OBJECTIVE

From the problem statement I have come out with objective which is :

i. To design Handy Disc Coconut Oil Palm Collector.
ii. To fabricate the Handy Disc Coconut Oil Palm Collector.

1.4 PROJECT SCOOP

i. Drawing process by using the Solid Works software.
ii. Design the Handy Disc Coconut Palm Collector that consist of features
    a. Portability
    b. Storage
    c. Durability
    d. Easy to handle
iii. Fabrication process by using engineering technique.
    a. Drilling
    b. Cutting
iv. The product can function efficiently

CHAPTER 2

LITERATURE REVIEW

2.1 INTRODUCTION

In this chapter it will discuss about the method that use on this day. Nowadays, the workers still use the conventional method like collecting by using hand, using scoop and basket and by using rake. In everything that people give an effort to do, there will be always an advantages and disadvantages. So, in this chapter it also will discuss about the advantages and disadvantages of each the method.

2.2 CURRENT'S METHOD

i. Collecting by using hand.
ii. Using scoop and basket.
iii. Using rake.

2.2.1 Collecting By Using Hand

This method was commonly use by the workers today. This is because of it is the easier method for the worker to collect the loose fruit. Nevertheless, collecting the loose fruit by using hands will not cost the workers too much. This method is the lowest cost method. Besides that, this method is also the clean method. The average weight of the collecting rubbish is low. It is about 9% only from the total average weight, and the 91% is the average weight of the loose fruit.

In addition, collecting by using hand will not damage the loose fruit. The oil palm obtained from the fruit (both the mesocarp and the kernel) of the oil palm tree. So, if the loose fruit was damaged, it will decrease the quantity of the oil that contain in the loose fruit.

Moreover, there was disadvantage for the collecting the loose fruit by using hand. The first one is the time taken for collecting is too long. So, by this will know it is not efficient method because the workers need to work faster. This is because there were a lot of loose fruits that need to be collect. Other than that, by using hand the workers will expose to the danger. Constantly the workers not wear the glove, they will not know the danger on the ground surface. So, the workers will expose to any injured that may be caused by the thorn or any sharp object.

Other than that, the workers need to sit, squat and bow. By this way the workers will always face sick back. This is wrong posture of body and it will causes difficult in emptying the bowels.

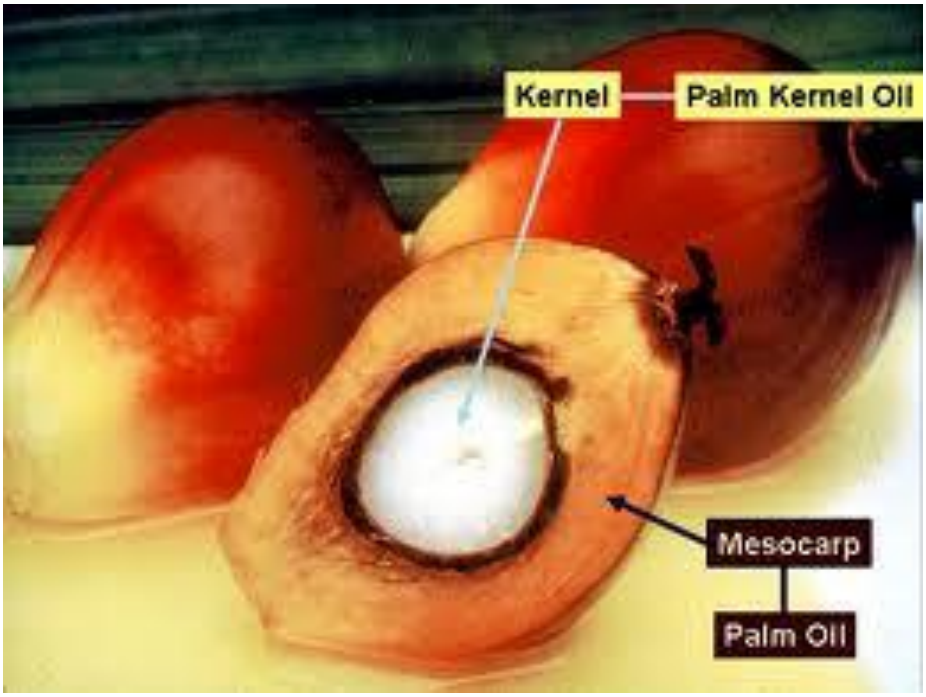

Figure 2.1: The oil palm obtained

Figure 2.2: Collecting by using hand

2.2.2 Using Scoop And Basket

This method also popular in used, many of the workers used this method. This is because of the low cost. The scoop is used to collect the loose fruit then the basket is used to store the loose fruit. Normally the worker cut the lubricant oil container to make the scoop. By doing so, this method will reduced the cost rather than buy the scoop at market.

Apart from that, the time collecting loose fruit is low. By this method it takes short time to collect the loose fruit. Besides, this method is easier compared to collecting the loose fruit by using hands. The quantity of loose fruit collected by using scoop is more than the quantity of loose fruit collected by using hands. So that it is the reason why the worker liked to use this method rather than collect by using hands.

Nevertheless, there were several disadvantages by use this method. Actually, the ways of using this method are only slightly different from collect the loose fruit by using hands. The workers need to sit, squat and bow. By doing so, it will affect the workers. The workers will faced the sick back by collecting in long time period.

Besides, by this method the loose fruits collected will be mixed with the impurities or rubbish. So, the quantity of rubbish that being collect is more than the quantity of the loose fruit. The ratio between the loose fruit and the rubbish that being collect is about 2:3.

Figure 2.3: The lubricant container usually used

Figure 2.4: Collect by using scoop and basket

2.2.3 Using Rake

This method is more modern than using scoop and basket. It is quite same to the method which collecting the loose fruit by using scoop and basket. There were several advantages and disadvantages by using this method. This method is easy to use. The workers just need to dump it before collect it and stored into the gunny.

Besides that, the rake is portable. It makes the worker easy to carry it everywhere since the type of ground surface at the coconut oil farm. Moreover, by doing this method the workers not need to sit, squat or bow. This prevents the workers by affect the sick back. Thus prevent the workers from the wrong body posture.

The disadvantages collecting the loose fruit by this method are the quantity of loose fruit is less than the quantity of rubbish. This is because the rubbish and the loose fruit was mixed. This situation is same with the method using scoop and basket.

Figure 2.5: Example of rake used

2.3 SUMMARY

So, from this time many of the workers were still use conventional method to collect the coconut oil palm loose fruit that is collect by using hand, using scoop and basket and using rake. Anyway, there were several advantages and disadvantages for each of the conventional method. As a human production, there is no such a perfect product produced by human being. Apart from that, to find the way to reduce the disadvantages and at the same time it also need to find ways to increase the function of the product and the advantages of the product.

CHAPTER 3

METHODOLOGY

3.1 INTRODUCTION

This chapter will discuss about the flow of this Final Year Project from the beginning until finish this project. The flow chart is very important to illustrate the sequence of operations to finish the work. The flowchart is generally drawn in the early stages. It will guide to finish the works. Meanwhile, the Gantt chart shows how the project is planned and seen instantly whether the project is behind or ahead of the schedule. The function of the Gantt chart is to guide towards the direction of the project plan. So, these two charts are very important to guide us to finish up the projects.

Moreover, in this chapter also will discuss about the concept generation. There were four design of product. Then, list the advantage and disadvantages of each of the product design. After that, proceed to finalize concept. This finalize concept is to choose the good one from the four design. The best product will proceed to another step, which is fabrication process. Before that, the material selection is needed to do. This is to select the suitable material that being to use. The material selection is also followed by the function of the product.

3.2 FLOWCHART OF THE PROJECT

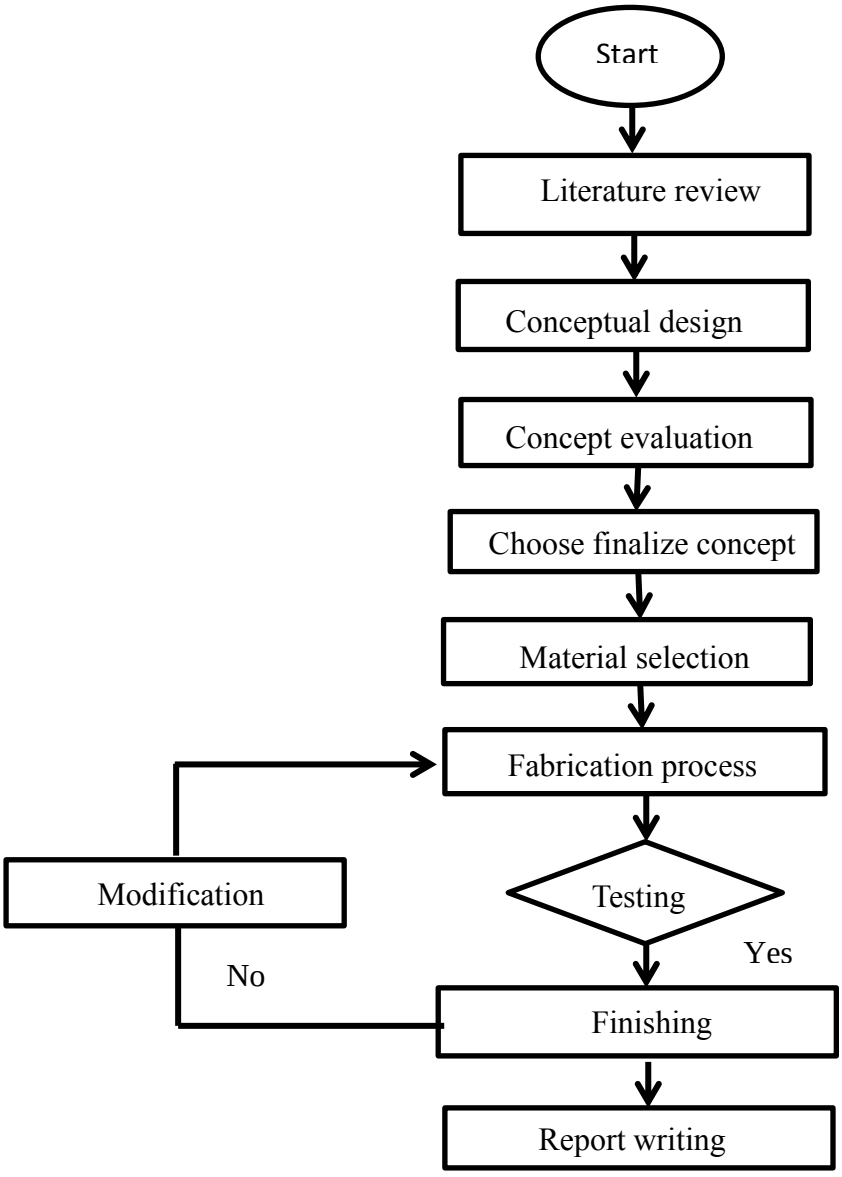

Figure 3.1: Flow chart for Final Year Project

Flowchart is very important to illustrate the sequence of operations to finish the work. It use symbol to represent of a process. Each of steps in the process is represented by different symbol and contains a short description of the process step. The top of the flowchart will begin with start.

Then it followed by literature review. On this step it will discuss about the currently method use. That is collecting by using hand, by scoop and basket and rake. Apart from that, there is list of advantage and disadvantage of each method. By doing so, know that which one is the efficient and which one is take short time in collecting.

3.3 CONCEPTUAL DESIGN

Next is conceptual design. On this stage, is need to design four products that function as to collect the loose fruit. At this stage also, it has been listed the advantages and dis advantages of each design. The advantages and disadvantages is carry out by the design and some criteria like storage, portability and easy to maintenance.

3.3.1 The First Concept

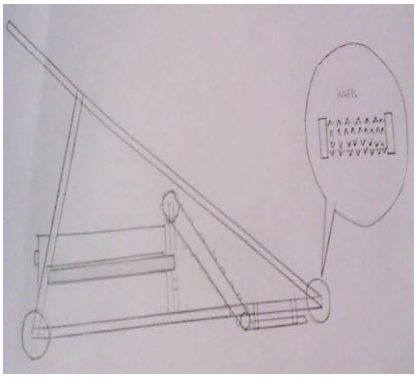

Figure 3.2: The First concept

The idea was comes idea from grass cutting machine. This concept uses the roller to collect the loose fruit. This concept is handles by push forward. The loose fruit that have been collected will move to the box that placed at the back. Besides, it have four wheel that to easy the worker to handle it.

In the other hand, there have some advantages that are easy to use and easy to handle. This is because it have wheel that easy to move it to everywhere. Other than that, this concept is confortable in use.

Although, the disadvantages is high production cost. This concept is using steel as the major component. The price of steel is increase because of the reducing of raw material. Apart from that, it makes the product heavy. Besides, this concept is not flexible in use at the coconut oil farm because of the ground surface there.

3.3.2 The Second Concept

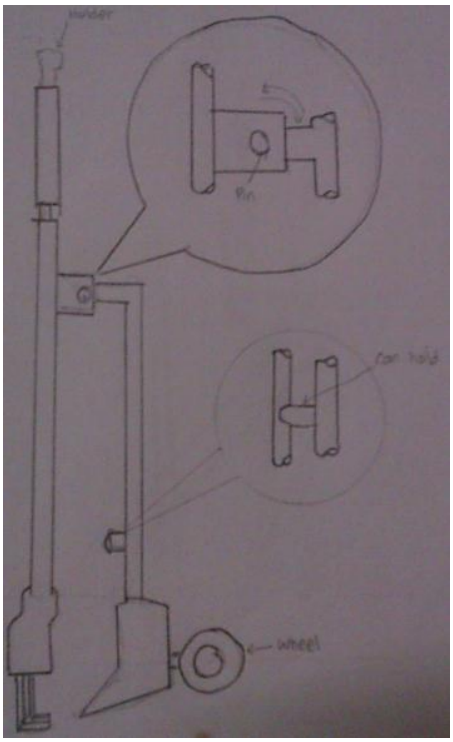

Figure 3.3: The second concept

This second concept is adapted by assemble the rake and the scoop. The rake is use to collect the loose fruit. When the scoop been removed, the loose fruit to the prepared container. This concept is, it contain a wheel to make the workers easy in their work. It make this product can bring by push or pull to move it to everywhere.

The advantages from this concept are portable. This is because it contains a wheel that will help the worker to move it. Besides, by this concept also the workers will easy to continue their work. Yet, the disadvantages for this concept are difficult to fabricate and difficult to maintenance. This is because the design is too complicated.

3.3.3 The Third Concept

Figure 3.4: The third concept

The third concept is show as the above figure (Figure 3.4). The advantage of this concept is confortable to use. The stick can be adjustable. The worker can adjust the height of the stick follow their confortable. Other than that, the cost of production is low. In addition, by this product there is not use the wide space to store it. The most important is, this concept is portability. It makes the workers easy to carry anywhere.

Moreover, this concept is light weight. By doing so, it is not difficult the workers to bring it. Although, the dis advantage of this concept is the loose fruit will damage or injury because the sharp of nails. But, the quantity of the oil that contain in the loose fruit that will flow out is small.

3.3.4 The Fourth Concept

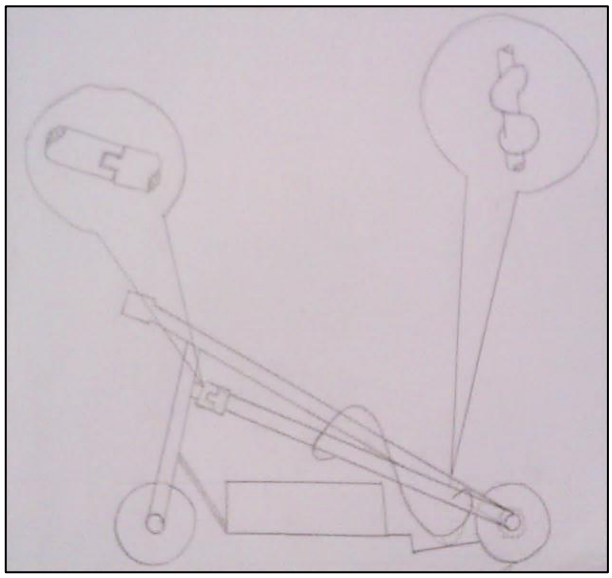

Figure 3.5: The fourth concept

This concept is same as the second concept but, it has some different. The advantages of this concept is the loose fruit will not injury or damage. This is because it using the roller to collect the loose fruit.

The disadvantage of this concept is difficult to fabricate. In addition, it used the huge cost to fabricate it. This is because the product is use steel to fabricate. Other than that, this concept need more space to store it. This is because the concept size is big. Moreover, this concept is not suitable to use in oil palm farm because it is not flexible with the situation of the ground surface.

3.4 CONCEPT EVALUATION

The product has made an evaluation on several criteria. Then, it will be rank with the performance of each concept by the criteria that have been chosen. The chosen of the criteria is by the suitable and makes easy for the workers. The concept evaluation is as the below table (table 3.2). In this step, it must have to carefully to give the rank to the each concept to choose to proceed to the fabrication process.

Tables 3.2: Concept Evaluation table

Criteria	Concept 1	Concept 2	Concept 3	Concept 4
Comfortable to use	5	4	5	3
Durability	5	5	5	3
Production cost	1	3	5	1
Portable	3	4	5	3
Easy to fabricate	1	3	4	1
Flexibility of used	1	3	4	1
Weight	2	3	4	2
Storage	1	3	5	1
Safety	3	3	2	3
Quality	4	3	4	2
Maintenance	2	3	4	2
Reliability	2	3	4	2
Total	30	40	51	24
5 = Excellent 4 = Good 3 = Medium 2 = Bad 1 = Very Bad				

3.5 CHOOSEN THE FINALIZE CONCEPT

The chosen of the finalize concept is by the performance of the concept. The concept that have more positive responds and have the highest score will be proceed to the next step that is fabrication process. So, on this step it have made full determination to choose the concept that need to be chosen. Before choose the concept, it need to make another table to classify which one is the very effective concept that will be to fabricate. The table is shown as the table below (table 3.3).

Table 3.3: Finalize concept table

Rates	Concept 1	Concept 2	Concept 3	Concept 4
Excellent	2	1	5	0
Good	1	2	6	0
Medium	2	9	0	4
Bad	3	0	1	4
Very bad	4	0	0	4
Action	Not proceed	Not proceed	Proceed	Not proceed

3.6 MATERIAL SELECTION.

The material selection is very important to maintain the quality of the product. Besides, the material selection is to make sure the product is long lasting. The appearance is also needed. Other than that, the material selection is also follows the design product. The material of the product must parallel with the product design. The picture below is the material used by the product.

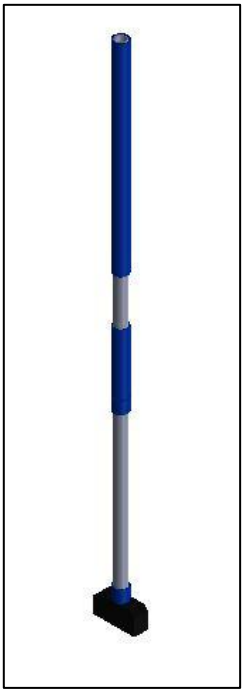

Figure 3.6: Mop stick holder

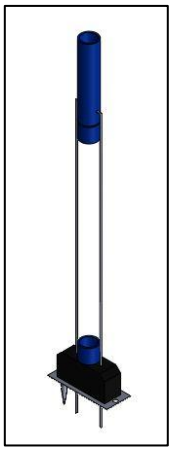

Figure 3.7: Section that can move upward and downward (the controller)

This figure is shown a mop holder. The mop stick holder is used to be the holder of Handy Disc Oil Palm Collector. The stick can adjustable. The workers can adjust the height of the stick. They can adjust by follow the comfortable to handle the Handy Disc Oil Palm Collector. There is a section that can make the stick move upward and upward. The section is shown on figure 3.7.

Figure 3.8: Bolt, nut and washer

The figure 3.8 is shows bolt nut and washer. This bolt and nut is using to tight the Perspex plate and connect the Perspex and the stick holder. The washer is place

between the bolt and the nut. This is to prevent the Perspex from broken. This washer is made up from the tire tube of bicycle. The rubber materials make it absorb the impact.

Figure 3.9: Round hollow steel

The figure 3.9 is shown round hollow steels. These hollow steels are for cover the wire. So, it makes the nice looking. It prepared as appearance to the Handy Disc Oil Palm collector to be more beautiful.

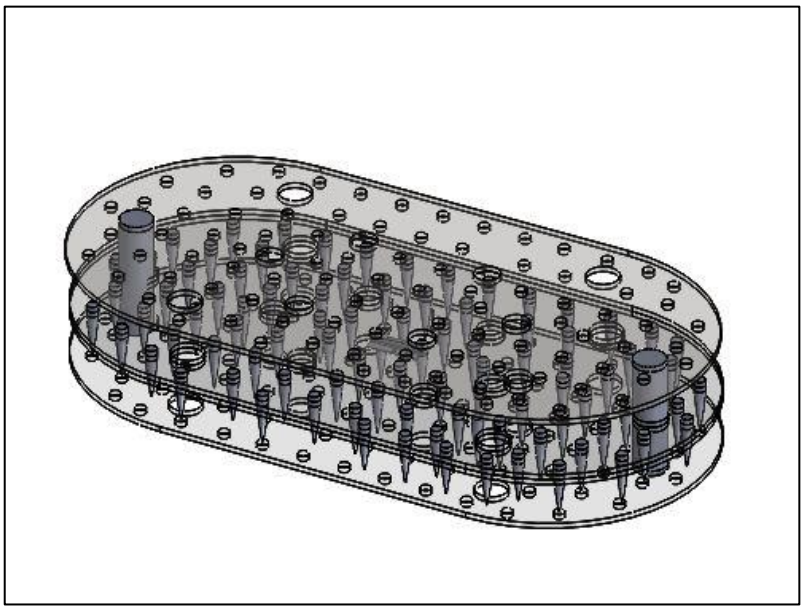

Figure 3.10: Clear Perspex and nails

The figure 3.10 is show nails and clear Perspex. The clear Perspex is chosen because it is transparent. It make the workers easy the loose fruit whether it stick or not on the nails. The nails function to collect the loose fruit. The loose fruit will stick on the nails because of the sharp edge.

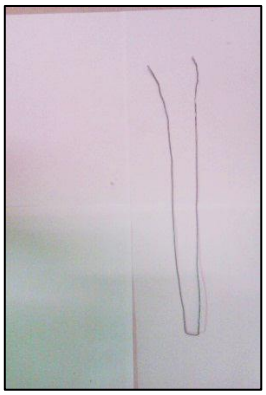

Figure 3.11: Wire

The wire is use to connect the controller and the Perspex to make a movement. This wire is the important medium to move the Perspex.

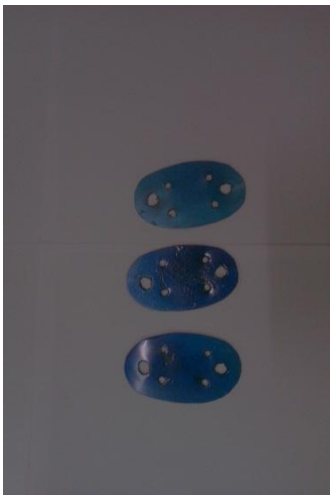

Figure 3.12 : Hard plastic

This hard plastic is use to hold the wire that connect to the Perspex. So, the wire will stick on the Perspex.

3.7 LIST OF MATERIALS

Table 3.4: List of materials

MATERIALS	QUANTITY	SIZE
Perspex	4	Radius = 150 mm Long = 600 mm Width = 5 mm
Bolt and Nut	4	Size M9 Long = 80 mm
Bolt and Nut	4	Size M6 Long = 30 mm
Bolt and Nut	4	Size M10 Long = 20 mm
Nails	107	2 inches
Mop Stick Holder	1	Long = 1200 mm Diameter = 20 mm

3.8 FABRICATION

On the fabrication process the student need to do practical from what have them learn the theory in the class and on subject mechanical laboratory class. The fabrication of Handy Disc Coconut oil palm Collector was entered the second objective. The process of fabrication is:

i. Measuring and marking process
ii. Cutting process
iii. Drilling process
iv. Finishing

3.8.1 Measuring And Marking Process

This process is the first process that needs to do. The measuring and marking process is need to get the accurate measurement and to get the shape before proceed to the cutting process. The figure show the measuring and making process on the Perspex.

Figure 3.13: Measuring and marking process

3.8.2 Cutting Process

The cutting process is the second process after measuring and marking. use the saw to cut the Perspex. This is because the vertical Bend saw is out of service. The using of saw need more time to finish up the cutting process. The below figure is example of saw.

Figure 3.14: Saw

The saw is use for cut the Perspex. Besides, the cutting process is also use to cut the tire tube and wire. use the scissor (figure 3.15) for cut the tire tube to make it as washers. Other than that, use a plier (figure 3.16) to cut the wire. The scissor is not suitable to cut the wire because of the wire is so hard. Besides, the plier also use to bending the wire.

(a) (b)

a) **Figure 3.15**: Scissor

b) **Figure 3.16**: Plier

3.8.3 Drilling

The process drilling is use to make holes for the bolt and nut. Other than that, it also makes holes for the nails. The figure below shows the driller. (Figure 3.17) is drilling machine and (Figure 3.18) is hand driller.

Figure 3.17: Drill machine

Figure 3.18: Hand driller

3.8.4 Finishing

The finishing process is needed to make sure the product is accurate size from the design. Besides, it is use to make the product is more attractive and nice looking. The file is use to make the Perspex is accurate size and nice looking. Then, the spray paint is use to make the product is nice looking. The below is show the figure of file (figure 3.19) and spray paint (figure 3.20).

Figure 3.19: File

Figure 3.20: Spray paint

3.9 SUMMARY

This chapter present on how the project is being conduct. It is about the progressing production of a Handy Disc Coconut Oil Palm Collector. Besides, it is discuss about the flow chart of the progressing project from the beginning until the project is done. Begin from the conceptual design, concept evaluation, chooses the finalize result, then material selection and fabrication.

In this chapter, there are four conceptual designs. That is first concept design, second, third and fourth concept design. In addition, there are also four process of fabrication, which are measuring and marking process, cutting process, drilling process and finishing process. The student need learn more technique to do the fabrication.

CHAPTER 4

RESULT AND DISCUSSION

4.1 INTRODUCTION

The result and discussion is function as an achievement of the target for the Final Year Project. However if the target is failure that mean the product is not operate functionally there were problems faced during the process and it will be discussed. Although the product is success functionally it also will be discuss too. This chapter is about understanding the result of the testing process. The result of the testing is the product can collect the loose fruit that scatter on the ground. Then, can move it into the container or gunny to store the loose fruit. The performance will prove whether the design is appropriate or not. The focus on this chapter is solely on the product of this project. Once the target is success achieve, then only the whole project process and result can be conclude in the next chapter.

4.2 FINAL PRODUCT

4.2.1 Overview Of The Product

The final product that have been done by fabrication process.

FIGURE 4.1: Final product

4.2.2 The Stick

The stick holder that has been use for the product is from the mop stick. This is because it has the controller that can move upward and downward. These movements help the collector section to collect the loose fruit and to remove it. When the controller is move to upward it may the nail to collect the loose fruit. The loose fruit will stab the on the nails, thus stick on it. Then, when the controller is push down, it will remove the loose fruit from the nails and the loose fruit will fall down. The stick holder also have the push button lock, it is function as lock of controller. Then, the controller is

assembles by wire to move the section of collector. This wire will move simultaneous with the controller.

Figure 4.2: The stick holder

4.2.3 The Collector

The collector is made up of four plates of clear Perspex and nail. The clear Perspex is used to see whether the loose fruit is stick on the nail or not. This is because the clear Perspex is transparent, so it easy to been see. The nail is use to collect the loose fruit. The loose fruit will stick on it because the sharpen edge. By the way, the loose fruit will damage or injured, but the quantity of oil that will flow out from the loose fruit is just a little because the surface damage or injure is small. The spring is act as the safety. This means, it will always push to upward the Perspex plate that contain nail. So it prevent the worker from got injured because of the sharp nail.

Figure 4.3: The collector

4.3 TESTING

This stage is about the testing of Handy Disc Coconut Oil palm Collector. The testing was done at Felcra farm oil plant. There, the product was tested where the product is success or not. Luckily, the product was success. The figure below shows during the testing of Handy Disc Coconut Oil Palm Collector**.**

Figure 4.4: Photo of the testing product at coconut oil palm farm

4.4 RESULTS

After the fabrication process is done, the next process was continued that is testing process. Going to coconut oil farm that locate at Tanjung Medang, Pekan. This farm is asset by Felcra Corporation. When test the product there, the result is satisfied because the product is successfully operates functionally. The below is the picture when the testing process was conducted.

Figure 4.5: The loose fruit on the ground

Figure 4.6: The Handy Disc is ready to collect

Figure 4.7: Collecting the loose fruit

Figure 4.8: The loose fruit stick on the nails

Figure 4.9: Moving the loose fruit into the gunny

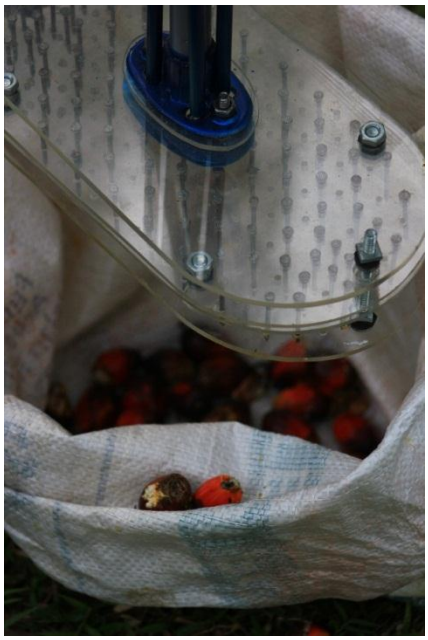

Figure 4.10: The loose fruit already been remove

4.5 PROBLEMS

i. Problems faced during progress the project.
ii. Problems during testing the coconut oil palm collector.

4.5.1 Problems Faced During Progress the Project

During the design and fabrication process of Handy Disc Loose Coconut Palm Collector, many obstacles were faced. The first was obtaining idea to design the coconut oil palm collector. The supervisors have given me some idea how the product work. The supervisors have told about the product that have done by senior student. So, by doing so the idea about the coconut palm collector has been got. Besides that, by surfing internet may add some useable knowledge. Next, the friends also had gave some idea about the product.

Next, is about the design by using solid works software. Take more time to design the product. This is because of not professional to use the software of solid works. The required helps by friends are needed to solve this problem.

During the process of fabrication, the student need fight for use the machines. This is because the useable is limited especially the Vertical Bend saw machine. This because it only just have one machine at the lab. The Vertical Bend saw machine is use to cut the Perspex to get the shape that wanted. But the most problems are the machine was out of service when want to use it. So as an alternative use the saw to cut the Perspex and file to get the accurate dimension.

The major problem that has been faced is time. This semester Diploma students have 20 credits hours. The Diploma students have to divide the time for focus the study, labs and for my Final Year Project. In addition, if the students have been held the position in any club such as MECHAPRO (the club of faculty mechanical engineering).So, many kind of activity had to handle. The lack of time makes me some interrupt to finish this Final Year Project.

4.5.2 Problems During Testing The Handy Disc Coconut Oil Palm Collector.

There were certain problem during the testing the coconut oil palm collector. The first problem is transportation. There are no transports to go the oil farm to test the product. So, as a alternative required helps from friends to solve this problem like borrowed the cars from friends.

Next, is about time. Find the suitable time to go the oil farm to test the product. This is because there not every day the workers cut the coconut palm. So, if on the lucky day, it will be found the farm that freshly cut. Then, need to get the permission from the owner farm to test the Handy disc coconut oil palm collector.

CHAPTER 5

CONCLUSION AND RECOMMENDATION

5.1 INTRODUCTION

In this chapter, a summary is established to conclude the whole of the Final Year Project. However, there were several problems that have been faced during finish this Final Year Project. The measures taken to rectify these problems have been identified and applied. There will be recommendations for future project of the same kind to improve it. Therefore a more complete understanding and enhanced application steps can be attained.

5.2 RECOMMENDATION.

There are some recommendations related to prepare the laboratory. In an opinion the university needs to prepare the laboratory correctly. When the machine is out of service, the maintenance is needed to repair the machine faster. This is for easy the student to finish up the project.

Because of the number of student is too many, the university is needed to prepare the enough of facility. The quantity of machine is not enough for the student. The student is needed to wait for a long time to use the machine. For an example the welding machine, there was just one machine that function, the other is not.

Moreover, the laboratory need extend the time opening. This is because there were always full at the laboratory by student to finish their project. The time for the

laboratory opening is limited. Besides, there also have class for subject of mechanical laboratory. The students need to fight with time for using the laboratory. So, the student is not enough of time to finish their project.

5.3 CONCLUSION.

As the conclusion, the project objectives were achieved. The first objective is to design the Handy Disc Coconut Oil Palm Collector. The simplest and best design was chosen. Then, the second objective is to fabricate the Handy Disc Coconut Oil Palm Collector. The fabrication process is finish smoothly, and the product already finish.

In addition, the materials used are also proven to be suitable material used to fabricated the Handy Disc Coconut Oil Palm Collector. By doing so, the Handy Disc Coconut Oil Palm Collector can withstand and functionally to collect the loose fruit. Besides, the fabrication process have required many skills that have been learnt the theory in the class and in the subject of Mechanical Laboratory such as material measuring, marking, cutting, and drilling.

Moreover, in the process of fabrication it lets the student to gain experience and develop the skill and the ways to operate the machines to complete the project. Besides, the student also had learnt how to solve the problems during the designing and fabricating process. This can be a first step for the student to enter the engineering world without empty of knowledge .

REFFERENCES

BOOK

Yusof Ahmad, Mekanik Bahan & Struktur, terbitan University Teknologi Malaysia, Skudai

Leo Alting, Manufacturing Engineering Processes, 2nd edition, Madison Avenue, New York, Marcel Dekker Inc. , 1999

WEBSITE

http://www.mpoc.org.my/The_Palm_Tree.aspx
http://www.ehow.com/facts_5444169_uses-palm -oil.html
http://en.wikipedia.org/wiki/Human_defecation_postures
http://www.edrawsoft.com/Flowchart-Definition.php
http://blog.projectplan.com/uses-of-gantt-chart-in project-plans/
http://palmoilis.mpob.gov.my/index.php/gs/exhibition/the-oil-palm-plantation
http://www.wilmar-international.com/our-business/plantations-palm-oil-mills/
http://www.jayatiasa.net/usr/pagesub.aspx?pgid=53
http://en.wikipedia.org/wiki/Elaeis_guineensis
http://www.mpoc.org.my/The_Oil_Palm_Tree.aspx

APPENDIX.

GANTT CHART

Table 3.2

ACTIVITIES	WEEK													
	1	2	3	4	5	6	7	8	9	10	11	12	13	14
Identify the problem														
Identify the scope , objective & project background														
Literature review														
Conceptual design/selection														
Material selection														
Concept evaluation & finalize design														
Material preparation & fabrication process														
Testing & modification														
Report writing														
Presentation														

FIGURE OF MACHINE.

Vertical Bend saw machine

PERSONAL PROTECTIVE EQUIPMENT (PPE)

Safety boots

Safety goggle

Safety jacket

LOGO OF CLUB

MECHAPRO club (club of Faculty Mechanical Engineering)