

Designing a new rubber tapping knife computer science



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Rubber tree is a tree that is used by the world community to collect the product. The product from rubber trees not only wood but also sap. However, the main product is rubber latex itself. Rubber trees are not available in many countries in the world. It was first found in the forests of Brazil. So far many countries for the purpose of planting rubber trees and agricultural economies of their countries in Southeast Asia such as Malaysia and Indonesia especially. Planting date became one of the major industries in these countries as economic resources and produce quality rubber. Rubber seedlings began to be brought into Malaysia from Brazil in 1877 from 'Hevea Brasiliensis' sepsis. However, commercial rubber cultivation began in 1902 and continues to grow at the same time contributing to the highest exports in the Philippines until the 1970s. Hence, Malaysia is a major producer after Indonesia and Thailand.

However, state revenue through sales of rubber-based products began to decline in recent years due to the use of synthetic rubber is more expensive than natural rubber in the market. To overcome this problem a lot of steps have been made to improve the quality of rubber produced. At the same time, a new effort has been made to diversify the products and rubber-based products. Besides latex, rubber trees have also been used in the furniture industry; the rubber leaves the country but also now has its own value in the handicraft industry in Malaysia.

Seeing the potential and the rubber industry are very proud and vibrant, the planting of rubber is recognized as a long-term enterprise that requires careful planning and commitment to achieve lasting results and quality.

PROBLEM STATEMENT

The thing that should do in this final project is to improve already tapping knife at market so that it can simplify rubber tapper to do their works. The products at market and also use by tappers are not comfort and ergonomic to hold. Besides, the knife uses by rubber tappers at this time need a high skill to use. It is hard for new rubber tapper or anyone that don't have a skill to conduct this particular works. If the tap is too deep it can cause damage on the wood.

In this project most important thing should be done is improve at latex incise machine at market now a days so that it can simplify tapper to do their work. The existing product at market always used by tappers not really comfort and ergonomic to be hold. Besides, the knife has been used by tappers need a high skill to use. If the incision is too deep will cause touch the stem tree and make the tree have a bump on it. So, to improvement that will do on this knife so that it can be used by tappers or even other people who do not have an experience or skill before.

OBJECTIVE OF THE PROJECT

To ensure that these problems can be overcome, some objectives have been placed so do not come out of its original purpose to solve the problem. The objective of this set is referred to the statement of the problem. The objectives are:

Design a new knife so that it is comfort when use.

It can be use by anyone who does not have a skill also.

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The tapping knife using electricity concept and can produce a same quantity and quality by using conventional method.

SCOPE OF WORK

The scope of this project is to design a comfort incise machine when hold by using material can absorb the vibration while tapping process. Besides, this tapping knife will be add with electrical element to make the incision process faster and produce a same quality and quantity with using the conventional way. The usage of electrical element inside the incise machine easy to used and can be recharge the battery so that tappers cannot spent a much money on that. The incise machine should have a mark so that it can be used by people who do not have skill. After that, the fabrication of the machine should be do and test.

CHAPTER 2

LITERATURE REVIEW

HISTORY OF RUBBER TREE

Rubber was originally used by native Central and South America. They have learned to produce a variety of latex products such as shoes are simple, bottles and a ball that can bounce. The famous traveler Christopher Columbus since 1496 the indigenous peoples of the world have seen playing with rubber ball like this. Materials that are considered odd were brought into Europe, and scientists have begun studying this material carefully to know the true state of this material.

Starting in the early 19th century, changes began to occur. In 1820, a person who is of English, Thomas Hancock invented a machine to soften, mix and form a rubber scrap. As a result of using this machine is a flexible and waterproof. In the 1870's, the Sir Henry Nickham was sent to Brazil to collect rubber seeds. Over 70, 000 rubber seeds were collected and brought back to England. Half of the seeds that were planted in special hot houses at Kew Gardens is located in London. Rubber seedlings sent to Sri Lanka and Pakistan and then to other countries in Southeast Asia to be planted on a large scale

In 1839, an American, Charles Goodyear was aware that the raw rubber could be improved by heating it with sulfur. This process known as vulcanization process. In the vulcanization process is to improve the quality of the rubber. Changes in temperature either low temperature or vice versa does not affect the rubber member is processed with this new way. With more discoveries of rubber has become an extremely popular and used until now even become a very important matter in life. Rubber has many uses. Malaysia became one of the main suppliers of rubber in the world. With the weather hot and humid all year round in Malaysia, it is suitable for rubber cultivation on a large scale.

The end of the 19th century, the use of cars in the United States began preferred. Not long later, Henry Ford was producing thousands of cars at the factory. Accordingly, the demand for rubber tires and spare parts of other cars has soared. So, the more rubber trees were planted to supply the required rubber. Many rubber plantations are open either a small or large from the north down to south of Malaysia. All of this is to accommodate the <https://assignbuster.com/designing-a-new-rubber-tapping-knife-computer-science/>

high demand for the world rubber industry. Therefore, many countries follow the rest of the world.

THE DISEASES OF RUBBER TREE

Rubber tree planted should be treated with good care and require regular monitoring. If the rubber trees are planted not be maintained and regularly monitoring it will cause the rubber tree easy to get infected. However, the diseases of rubber trees are not only attacking the young and new rubber trees but also attacks matured tree. Therefore, careful monitoring should be conducted with regular frequency so that the rubber trees grow healthy and lead to a good quality rubber.

The diseases namely:

Root disease (Penyakit Akar)

Mushroom Disease (Penyakit Cendawan)

Stem disease

2. 2. 1 Root Disease

Root disease is a deadly disease that attacks the matured rubber tree. Root diseases cause by fungi that attack the root bark at first, and then penetrate the wood and rubber tree roots eventually become outdated and dead.

Fungal spores to be blown by the air and landed in any parts of the rubber tree wood that s expose due to wound or injury. In addition, root disease may be cause by a meeting of the roots; the well roots meet with disease

roots. There are six types of diseases that attack the roots of rubber tree, the white root disease (Penyakit akar putih), red root disease (penyakit akar merah) and brown root disease (penyakit akar perang) that can be classified into major types. The name of root disease is based on the skin colour.

Another three types of root disease are called 'Penyakit Akar LapukUstulina', 'Penyakit Akar Lapuk Poria', and 'Penyakit Akar Lapuk Busuk'.

White Root Disease (Penyakit Akar putih)

The name of fungus that attack white root disease is 'Rigidoporous Lignosus'. The white root disease assumes the most dangerous because it is easy to faster spread. The fungus is white colour and look like a thread covered around the root. The shape of Rigidoporous Lignosus is circle and big at based and sharp thin at the end and getting change at the colour to light orange. The mother of the fungus is orange at the top and red at the bottom. The mother of fungus usually can be seen at the dead stumps and it's always attack a young tree.

Red Root Disease (Penyakit Akar Merah)

The fungus that attack red root disease called 'Ganoderma Pseudoferrum'. This fungus is red and blotched at root. This disease attack by soil attached to the root. The mother of red root disease is dark red at the top and light grey at bottom part. This fungus is usually found on dead stumps because of the infected of the disease.

Brown Root Disease (Penyakit Akar Perang)

The fungus that attack brown root disease is called 'Phellius Noxius'. The fungus condition of brown root disease is almost same with red root disease but the colour of the fungus is brown. The root condition that attack by the disease is freckled when it's cut into two. Besides, it is can be seen the strips on the surface.

Others Root Diseases

Besides the big root disease, there are three types of small root disease. 'Penyakit Akar Lapuk Ustulina' because of 'Ustulina Deusta' fungus. This type of disease can be treated by loping which root that have infected and then swept with tar. 'Penyakit Akar Lapuk Poria' because of 'Poria Hyperbrunnea'. The way to solve the disease is same with 'Penyakit Akar Lapuk Ustulina'. For "penyakit Akar Lapuk Busuk' it is because 'Sphaerostilbe Repens'. This disease can be treated by remove all the infected tree together with its roots. In addition, the water system should be repaired so that root disease can be controlled.

1. 2. 2 Bad Mushroom Disease

In bad mushroom disease there are three types of it, which:

Bad Mushroom Disease

The fungus that attack bad is 'Ceratocystis Fimbriota'. The rubber tree that always attack by bad mushroom disease is a clone tree which PR107 and RRIM600. Bad mushroom disease usually attack tapping panel at rainy season moreover if the field is copse. The tapping panel will be obsolete and there are fine patches in white colour which a little upper from the incision <https://assignbuster.com/designing-a-new-rubber-tapping-knife-computer-science/>

groove. Next, the patches change into grey. When grow, the patches are not same with the groove incision. The fungal spores ' Ceratocystis Fimbriota' can spread faster when it is blown by air or wind and insects. Besides, the infection of the bad mushroom disease also happened through incision instruments mostly the knife itself.

Black Scratch Disease (Penyakit Calar Hitam)

The fungus that attack black scratch disease is ' Phytophthora Palmirora'. This disease attack on the incision panel of the tree. Rubber trees that always infected by these diseases are from clone PB 86, PR107, AVRUS 2037, RRIM 600 and RRIM 623.

Incision Panel Necrosis (Nekrosis Panel Torehan)

The fungus that attack the incision panel necrosis is called ' Fusarium Solani'. These types of disease attack a new panel incision and sometimes also attack the old tree. The types of tress that always attack by this particular disease are; PB 5/51, PB 28/83, PR 107, RRIM 605, RRIM 612, RRIM 623 and RRIM 628. Panel incision disease attack a new panel and boundary groove panel. Sometimes, this disease attacks the injury of the tree. The injury diameter in 0. 5 until 1. 5cm dark brown colour or may be grey can be seen at the incision groove.

Wind Fungal Disease (Penyakit Cendawan Angin)

The fungal name of the wind fungal disease is ' Corticum Salmonicolor'. This disease usually attack limb and branch of rubber tree age between three to

eight years old. This disease worst on rainy season. The trees that expose to the disease are RRIM 501, RRIM 600, RRIM 607, PB 28/59 and PR 255.

1. 2. 3 Stem Disease

There are two types in stem disease. The two types are:

Bad Stem Disease (Penyakit batang Lapuk Ustulina)

The name of the fungus is ' Ustulina Deusta'. This disease attack everywhere around tree stems. The fly ' Ustulina Deusta' fungus spores will penetrate the stems tree through the expose tissue or old illness. Besides, there are trees that injured because of lightning and burn easy to get this disease.

Phellinus Bad Stem Disease (Penyakit Batang Lapuk Phellinus)

The fungus that attacks these types of disease is called ' Phellinus Noxius'. This disease always attack matured tree. The fungus spores attack and infect parts or injured limb, the infected mostly happened at injured because of air blow. The injured part then will spread until the root of the tree. The stem the will form like a bees nest because of the disease.

RUBBER PROCESSING

The raw latex from rubber tapper need to process before it is sent to factory or export. The processing of raw latex is in few ways. For example of the process is based on the weight, pure latex is 1/3 of rubber besides sugar, protein and salt that dissolved together in water.

The first process called conglomeration process. The latex then will be sieve first to remove all unneeded stain and foreign material. Next, the latex will pour into a tank or big reservoir with much water and will be added ascetic acid or formic inside it. This will cause the particle of the rubber combine together and became a solid conglomeration. Inside the tank, the latex will form into rubber sheet by using a metal plate. This rubber sheet then will be sent to do a drying process. A big roller use to squeeze the water that still inside the dried rubber as much as can.

The next step is the rubber sheets will cut into small parts and will dry once again by smoky process. This process indirectly avoid the rubber sheet from infect by fungus. Another one process to produce a rubber is the rubber will be cut into smaller pieces by machine and will added an oil inside it, drying and will be pressed became a rubber. Besides, rubber also sells inform of latex. Water will be separate from the water and then it will add some chemical to avoid the latex became conglomeration. Therefore, these processes did by machine. The processed latex called viscous latex and this latex very useful mostly for factories that produce goods like rubber glove and host pipe.

HOW THE RUBBER TREE BEING INCISE

To get much quantity and result of the latex, the tree must be incised by early morning. This is because at the early morning latex is easy to flow and produce much latex when incise. Even so, if the tree incised at late evening or even noon the latex is hard to flow and produce little latex compared incise at early morning. To incise, rubber tapper need a special knife to

incise stem bark layer. The process to incise the bark need to do very detail and carefully so that it cannot hurt the stem tree. The incision will pierce over the cells of the tree and then latex will flow slowly through it and go into the cup that placed at the bottom stem tree. The cup that container the rubber placed at the bottom of incision stem bark area. However, to start incision at a new tree and not ever incise before, the incision should start 150cm from the root or land and diameter 45cm. The latex that flow out from the tree is white and like milk. The latex will stop from flow two to three hours after the incision process. After two or three hours rubber tapper came back to collect the product by pouring the latex into a bucket. After that, rubber tappers bring their product to collecting centre. At the collecting centre, buyers already there to buy their entire product to send to the factory that need a rubber product. Even so, if the selling in form of rubber scrap rubber tappers will collect their product after two or three incision process equal with two or three days after the tree incised. The scrap will solidify based on the form of the cup. At the scrap can be see the line on solidify latex on the days.

THE INCISION WAYS OF RUBBER TREE

Rubber tree can be incised by two ways which:

Pulling Way (Downwards Tapping)

Pushing Way (Upwards Tapping)

1. 5. 1 Pulling Way

Pulling incision usually used by most tappers in Malaysia especially in north. This way uses a different knife with pushing incision knife. The shape of this ways knife is curve at the end of the knife.

1. 5. 2 Pushing Way

While pushing incision mostly use at south Malay namely Johor. The knife in this incision totally not same with pulling way knife because this knife shape is straight and ' V' shape at the blade. However, tappers preferred to use pulling ways better then pushing way.

Even there are two types of incision way, but the ways of incision never contribute to the how much the latex flow out or the quantity from the tree.

INCISION TECHNIQUE

The technique of incision is important so that the incised tree produce maximum latex. Moreover, the right technique contributes to good result for tappers. The purpose of the technique incision is to cut the latex channel systematically where the latex can be produce systematically. This technique is introduced by RISDA. There are some factors contribute to the better result. The factors are:

The Channel of Incision

The incise tree will produce latex which flow out through the channel inside the bark tree itself. The location of these channels placed at left bottom around the stem tree and lean about 3. 7° to 5° from vertical line. To

produce the latex from the tree, the channels should be cut. The furrow of incision must do from left top to right bottom for cut much latex channel.

Location of latex channel

Wrong incision way

Right incision way

Figure 2. 6. 1 The channel of incision

The Steep of Channel Incision

The channel incision should be made by way so that to get the maximum result with a minimum bark uses. The preferred is 30°. The bark of clone tree usually thinner, but the latex is much, the extra steep make the latex flow out faster into the ready cup and it not overflow to the stem of the tree.

The High of Channel Incision

The high of channel incision should make from the ground up to 150cm or 5 feet. The high can be measure by a special instrument or for old tappers they can assume the high and the steep itself. If there is a limb between high 150cm, the limb should be lopped.

The Trunk Diameter

The stem or trunk can be opened is 45cm incision site, measured according to the recommended height of 150cm for the ground or land.

Tapping Time

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The best time to do tapping process is when the rubber tree can be seen without the aid of light or about 6. 30a. m. ' Tugor' pressure are still strong at that time accelerate the flow of latex. Besides, the tree is still fresh and efficiently drains the latex. The result tapping at 6a. m more than 20% than tapping at 2p. m where the normal incision cannot be implemented because of rain and wet his incision site and through late incision is at 11a. m.

The Depth of Incision

The bark of the rubber tree consists of several layers:

Outer layer – Skin cork: – as a protective layer inside.

Second layer – Hard cover: – also known as layer of rock because there are very little vessels of latex.

Third layer – Soft skin: – there are many channels inside it.

Table 1. 6. 6 Number of latex vessels cut

The latex channel position is in the ring in the closed circle. Near the timber there is a cambium skin. The fifth layer is the channel horizontally across the skin, called the radius of the pitch. Role in bringing water from the cambium allergic skin and food from skin wood.

Number of latex vessels cut	The deep of tapping	Number of latex vessels
cut2. 0mm from the skin	1. 5mm from the skin	1. 0mm from the skin
0. 5mm from the skin	38486280	

The Thickness of Incision

Table 2. 6. 7 Number of latex vessel cut

The thickness of incision did not significantly affect the production of latex because latex are coming out are equal. Thick slices will:

Curtail economic age of rubber trees.

Recovery could not tap the skin.

Just enough to remove the clog pumps latex at the end of the channels estimation interval of 1mm to hack a day. To score two and three day interval required for same thick skin incision on the beam was gradually dried.

CALCULATION METHOD OF PRODUCTIVITY AND SELLS PRICE OF RUBBER

Rubber Productivity Calculation

$$\text{PRODUCT (kg/hect/year)} = \text{g/t/t} \times \text{NTS}/1000$$

Where; g/t/t – result for one incision tree

NTS – number of tree for one hectare

NID – number of incision day

Example:

$$\text{g/t/t} = 30\text{g}$$

$$\text{NTS} = 500 \text{ trees}$$

$$\text{NID} = 144 \text{ days}$$

Product (hectare/year) = $30 \times 500 \times 144/1000$

= 2,160kg Rubber Sells Price Calculation

SMR 20 Price = 560.00 cent/kg

Discount price: = 100.00 cent/kg

Sos = 13.17 cent/kg

Processing cost = 35.00 cent/kg

Logistic/shipping cost = 10.00 cent/kg

Others cost = 11.22 cent/kg

Transportation = 10.00 cent/kg

Margin = 10.00 cent/kg

Total = 120.00 cent/kg

Price for 100% KGK: = $560 - 120.00$ cent/kg

= 440.00 cent/kg

50% KGK: $440 \text{ cent} \times 50\% = 220.00$ cent/kg

55% KGK: $440 \text{ cent} \times 55\% = 242.00$ cent/kg

62% KGK: $440 \text{ cent} \times 62\% = 272.80$ cent/kg

KGK - 'Kandungan Getah Kering'

Example:

Wet scrap product = 4, 000 kg/hectare/year

KGK = 50%

Income = 4, 000kg x 220 cent/kg

= RM 8, 800/hectare/year

PRODUCT OF RUBBER OR LATEXS

All transportation in road and air like cars, buses, lorries, bicycle and airplane are use tyre made from rubber. Rubber use to make tyres because it resist to high temperature when it friction to the road. The production of world rubber spends about 60% to tyres industries. Tyre divides to four components which inner tube, side wall, frame and the pattern of the tyre.

In tyre processing the most important element is carbon. Carbon is fine black powder that make tyre is black. For each kilogram rubber use to produce tyre, almost half of that are carbon. Besides, carbon able to increase rubber strength and it can avoid the tyre from torn. Another raw material used in tyre process is steel thread, nylon synthetic rubber and so on.

The base of tyre is frame. The frame produced by insert the rubber into the roller machine. The machine will process rubber mixture until it became a smooth rubber sheet. The rubber sheet will friction with something called 'tetulang'. The side wall as a protector from damage. The side wall and the tyre's pattern are built separately. Lastly the tyre will go to machine to do

the shaping process. The machine called press machine. All tyres have a different structure. For example, airplane uses 100% pure rubber in their process.

2. 9 PATENT SEARCH

For this product which latex incise machine, there have no paten because almost rubber tappers use conventional way to tapping which use an old knife. However, there still have private person who design and develop an incise machine to simplify tappers to tapping with comfort and more ergonomic. Even so, the designed incise machine not be patented and this is cause the related data of the machine none. For that matter, in this research, existing product used to be studied detail about usage of the already existing instrumentation.

EXISTING PRODUCT OF TAPPING KNIFE

The existing product at market took to be studied about their usage detail before design a new incise machine for tapper. The existing product at market now days still the conventional way which using the traditional knife to tap. However, there are knives got a little improvement on it to simplify tappers.

Figure 2. 10. 1 Traditional knife

The picture above shows the traditional knife use by almost rubber tappers in Malaysia. The knife made by metal entire the knife. The holder of the knife make by metal too. Even though the price of the knife cheap but if the blade

or the cutter of the knife is broken then tappers need to change to the new one. The holder is hard and will hurt tapper's hand when they hold on it.

Figure 2. 10. 2 Improved knife

This is another one of tapping knife sells at market. This knife is improved by the old knife. This knife was designed and produce by Electrolux Company. The holder made by plastic. This way can reduce hurt and force on tapper's hand when their use this knife. Besides, this knife has a roller at the cutter to easier tapping process. The knife can move freely and easy without stuck because of this roller. The cutter blade also has an adjuster to setup the required deep and thickness when tapping. In addition, this instrument is light in their weight because it has been change the material at the holder.

OTHERS TECHNOLOGY

Besides the current technology or conventional way use now days to get latex, there is another technique use to get latex from rubber tree which called ' Impale way'. Impale way use a special needle made from steel. This way very seldom use in Malaysia or even entire world. This is because this technique just produces a little latex than using a tapping technique using knife. This technique did by impale the needle to make a small hole at the bark or skin of rubber tree by followed the latex channel inside the bark.

Other technique to produce maximum latex when tapping is using a gas to embolden the latex flow out. One of the techniques called ' G-Flex' technique. This technique was introduced by RISDA. This way is used about five years ago. The usage of this technique increases the income of rubber

tappers for many times. This technique is a embolden technique that used etilina gas that give to the tree directly with a periodic time. It is use a special instrument and just need a short incision. Usage of this way will produce 100% latex than using already existing technique. The use of this gas is safe and friendly user and nature with a cheaper cost.

CHAPTER 3

METHODOLOGY

3. 1 INTRODUCTION

In this chapter will describe how the designing incision machine. Before do the designing process there are few factors that need to know and do to get some information and data about the existing incision instrument. Designing process starts with get information from related people in this industry. This information and data are very important to design an incision machine that can be accepted by people mostly by tappers. In this chapter also will describe how the finding information did and analyzed the information. After the analyzed process done, designing process can be start based on the customer requirement.

3. 2 METHOD OF COLLECTING INFORMATION AND DATA

To collect required information to enable designing new latex incise machine, a few methods are used. The used methods are the best methods to find and collect information based on the next process. This method have been choose because it can give more information require in order to

dissolve this project. The methods used are:

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Questionnaire

Observation

Interview

3. 2. 1 Questionnaire

For this method, the related questions asked to get the ensure, data and related information with the procedure and the management when incision process did. The questionnaire asks for rubber tappers in Kedah and Perlis. Most of the question is related with the incision technique and the product from the incision.

3. 2. 2 Observation

This method did to see how the tappers work on the field and see the result. This method is done together with questionnaire while go to the field to see tappers work.

3. 3. 3 Interview

This method did to know about the current technology that related with latex incise machine in Malaysia or even entire world. This interview did at RISDA Alor Setar main office. All the question that have been asked is about the technology of incision and about the rubber tree itself.

3. 3 ANALYSIS OF THE INFORMATION AND DATA

3. 3. 1 Time tappers go to their work

Figure 3. 3. 1 Chart of working time

From the pie chart above it shows the time when the tappers go to their works. The charts tells the mostly tapper around five person from ten responders go to works at 8 a. m. follow by three responders go work at 7 a. m. and another two responders go work at 6 a. m. This is because most responders are women. They go for works after finish their works at house first before go to tapping. For responders who go for works at 6 a. m. is for contract tappers for example from Thailand.

3. 3. 2 Time of tappers working hours

Figure 3. 3. 2 Chart of time of tapers working hours

From the chart can be seeing that most of tapper works around five hours a day. It is follow by four hours and three hours a day. However, there still have tappers work more than five hours. The hour of working of tappers are actually depending on weather. If the day is rainy, tapper would not go to work and vice versa. Besides, the working hour also depend on the tappers effort to their work, if they have any matters to do so the working hour will be short and vice versa.

3. 3. 3 Days of tappers works in a week

Figure 3. 3. 3 Chart of days of tappers work in a week

The day of work by tapper is not consistent. It depends on area of the field. If tappers have more than one field, the tapping process in field will do

alternate with other field but most of tappers work five days in a week follow by six days, four days and the rest is work almost every days.

3. 3. 4 Number of tree tapping in a day

Figure 3. 3. 4 Chart of number of tapped tree in a day

Most of tapper will tap more than 500 trees in a day. However, the number of tree is depending on the tappers effort to tap a number of the trees. The data followed by 400 trees, 300 trees and the rest is 200 and 100 trees in a day by the same value. The number o the tree will be tap is based on field area that tappers work on the day. One hectare of rubber field content about 500 to 550 trees. So, tapper will work based on the area of the field.

3. 3. 5 Time take to incise for a tree

Figure 3. 3. 5 Chart of time of incision

The time of the incising process is depending on the tappers skill. If the tapper has a high skill so they just need a short time for one incision process. From the pie chat above, all responders are needs ten second to incise one tree.

3. 3. 6 The way to incise

Figure 3. 3. 6 Chart of incision technique

There are two ways of incision technique which upwards incision and downwards incision. The chart shows all responders use downwards technique. This technique is base on tappers comfortable level when incise.

Can be says that most tappers in Malaysia use downwards technique to incise better than upwards technique. However, there is still has tapper use upwards technique.

The analysis above describes few questions that contain in questionnaire. All those questions are to see the way of tappers manage their work and the technique of their work so that design process of new latex incise machine can do.

3. 4 VOICE OF CUSTOMER NEED

Voice of customer need get from analysis did from questionnaire. From the questionnaire can be know that what is actually customer want from the new latex incise machine. The voice also gets from observation and was adapted to customer voice. The voice of customer needs shows in the table below.

CUSTOMER STATEMENT

NEED STATEMENT

Need light weight knife

Can bring anywhere

I like easy tools

Easy when tapping process and do not need a high skill

I do not like to use manual handling

The knife should be automated tools.

I like the knife is comfort when I hold it.

The holder should have a smooth layer.

Table 3. 4 Customer voicel need a safe tapping knife

The knife should have a cover especially at the cutting blade.

3. 5 CUSTOMER NEED

In order to archive the objectives, identify customer need is very important part to enable designing new product that meets their want. Designing process should starts from the problem that faced than can design the new thing.

3. 5. 1 Identify customer need

The table below shows the customer need on the new latex incise machine.

No.

Product

Need

Imp

1

Incise machine

Easy to use

5

2

Incise machine

Safe to use

5

3

Incise machine

Portable

3

4

Incise machine

Light weight

3

5

Incise machine

Affordable

4

6

Incise machine

Easy to sharpen the cutting blade

3

7

Incise machine

Comfort when hold

4

8

Incise machine

Rechargeable battery

3

9

Incise machine

Last a long time

4

10

Incise machine

Easy to maintenance

3

11

Incise machine

Faster

3

Table 3. 5. 1 Customer need

Description of the scale:

Not important

Less important

Important

Slightly important

Most important

3. 5. 2 Establish metric and units

Establish metrics and units' table indicates the relative importance of each metric and its units. A metric stand for ' subjective'. The value of metric should be able to correlate perfectly with the satisfaction of needs and they

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should be depend variables. However, there are some needs that cannot be easily translated into quantifiable on the metrics.

Metric

Need

Metric

Imp

Unit

1

1, 2, 3, 4

Total weight

4

Kg

2

1, 2, 7

Force

5

F

3

1, 7, 8, 10

Time to assemble/disassemble for maintenance

4

5

4

8, 9

Life span

4

Years

5

1, 3, 4, 7

Dimension

5

M

6

2, 5, 6

Cost

3

RM

7

11

Tapping time

3

s

Table 3. 5. 2 Establish metrics and units

Description of the importance:

Not important

Less important

Important

Slightly important

Most important

3. 5. 3 Links metrics to customer need

NEED

METRIC

1

2

3

4

5

6

7

Total weight

Force

Time to Assemble/disassemble for maintenance

Life span

Dimension

Cost

Tapping time

1

Easy to use

2

Safe to use

3

Portable

**

4

Light weight

**

5

Affordable

*

6

Easy to sharpen the cutting blade

*

7

Comfort when hold

8

Rechargeable battery

**

9

Last a long time

*

10

Easy to maintenance

*

11

Faster

*

Table 3. 5. 3 Link metrics to customer need

3. 5. 4 Bench mark on customer need

NEEDS

COMPATITORS

Competitor 1

Competitor 2

Competitor 3

Easy to use

a^? a^? a^? a^? a^? a^? a^? a^? a^?

Safe to use

a^? a^? a^? a^? a^? a^? a^? a^? a^?

Portable

a^? a^? a^? a^? a^? a^? a^? a^? a^?

Light weight

a^? a^? a^? a^? a^? a^? a^? a^?

Affordable

a^? a^? a^? a^? a^? a^? a^?

Easy to sharpen the cutting blade

a^? a^? a^?

Comfort when hold

a^? a^? a^? a^?

Last a long time

a^? a^? a^? a^? a^? a^? a^? a^? a^?

Easy to maintenance

a^? a^? a^? a^? a^? a^?

Faster

a^? a^? a^? a^? a^? a^? a^? a^? a^?

Table 3. 6. 4 Bench mark on customer need

a^? Weight - more weight shows the ability to meet the customer requirement.

3. 6 PRODUCT DESIGN SPECIFICATION (PDS)

The specification of the product is generate from the customer need on the new latex incise machine. This specification is based on the tappers suggestion on the new tools and from the voice of customer. All the voices are getting from the questionnaire and observation that have been done.

No.

Criteria

Conventional tapping knife

New incise latex machine

1

Size

14 - 17 inch

< 17 inch

2

Holder

Do not have any pad at the holder

Have a pad at the holder so that tapper feel comfort when use and strong hold

3

Automated

Manual tapping way

Using rechargeable battery

4

Cordless battery

Manual tapping way

Have an extra battery to be change when it is empty

Table 3. 6 Design consideration

Product design specification

Latex Incise Machine

Function

This machine designs so that can help tappers to do their work more efficient besides produce maximum result or product. This machine used motor to simplify rubber tapper to tapping. With the uses of motor can make their work faster. Besides, this machine was added comfortable and safety factor on it so that tapper feel comfort when hold this machine. The additional factors are put some rubber pad on the holder and protector on the cutting blade.

Customer requirement

Easy to use and handle

Energy safe

Friendly user

Affordable

Faster

3. 6. 1 Physical and operational characteristic

Design requirement

Performance

Moving cutter by using DC motor

Have a switch to on and off motor

Using cordless battery

Can use for long time

Safety

Have a protector at the cutting blade

Have a rubber pad at the holder to make strong hold

Physical

Faster

New appearance of the incise machine

Rubber pad at the holder

3. 7 DESIGN CONCEPT GENERATION

To overcome this problem a few concepts have been done to design the good incise machine and can be used by tappers to help them simplify their works.