



## **SAND FILTER MACHINE**

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**POLITEKNIK SULTAN SALAHUDDIN ABDUL AZIZ SHAH**

**JUNE 2019**

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This Report Submitted in Partial Full of Requirement for  
The Diploma of Building Services in the Department of Civil Engineering  
Polytechnic Sultan Salahuddin Abdul Aziz Shah

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TITLE : SAND FILTER MACHINE

SESSION : JUNE 2019

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as a project supervisor on a date

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## **APPRECIATION**

Praise to the Almighty because of Him pleasures we able to complete enough this project of Sand Filter Machine of final year project for building services and success of this report.

In this opportunity, we are highly indebted to our supervisor, Madam Normalini Binti Mansor for her guidance and supervision on us as well as for providing necessary information regarding the project and give encouragement also support us in completing this project.

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## SAND FILTER MACHINE

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### **Abstract**

In recent years, the use of sand filter machine has gradually increased. But, most of them are quite large and difficult to be move. Besides that, the price to own it is quite expensive. With that, there are a large number of construction workers who have to exert their energy to making sand filters by themselves in the traditional way. However, there are some problems that come with using the traditional sand filter. Among these are, the construction workers have to exert their energy to build the sand filter. In addition, refined sand will mix with foreign matter when refined sand falls to the ground. Therefore, we have created a product that can facilitate the construction work of the construction site. Our main goal of creating sand filter machines is to reduce the workload of construction workers when they want to filter or use sand filters. It runs using an electric motor that will shake the filter. We just need to put the sand on the filter and the sand will be filtered with the shake that is produced. The sand filter machine is equipped with a funnel as a way for fine sand to fall. All we have to do is put the wheelbarrow next to the sand filter and the sand will drop into the wheelbarrow. It is different with the traditional sand filter where the refined sand falls, we have to put it in the wheelbarrow. It will use more of construction workers energy. Most important is that the filter machine is easy to move around in construction as it is equipped with two suitable wheels. It will make it easier for construction workers to filter sand in one place or another place.

## MESIN PENAPIS PASIR

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### Abstrak

Dalam beberapa tahun kebelakangan ini, penggunaan mesin penapis pasir telah meningkat secara beransur-ansur. Tetapi, kebanyakan mesin penapis pasir tersebut agak besar dan sukar bergerak. Selain itu, harga untuk memilikinya agak mahal. Dengan itu, terdapat sejumlah besar pekerja binaan yang perlu mengerahkan tenaga mereka untuk membuat penapis pasir sendiri dengan cara tradisional. Walau bagaimanapun, terdapat beberapa masalah yang timbul dengan menggunakan penapis pasir tradisional. Antaranya adalah, para pekerja perlu mengerahkan tenaga mereka untuk membina penapis pasir. Di samping itu, pasir halus akan bercampur dengan benda asing apabila pasir halus jatuh ke tanah. Oleh itu, kami telah mencipta produk yang dapat memudahkan kerja buruh binaan di tapak pembinaan. Matlamat utama kami untuk mencipta mesin penapis pasir adalah untuk mengurangkan beban kerja pekerja pembinaan apabila mereka mahu menapis atau menggunakan penapis pasir. Ia berjalan menggunakan motor elektrik yang akan mengoncangkan penapis. Kita hanya perlu meletakkan pasir di atas penapis dan pasir akan ditapis dengan goncangan yang dihasilkan. Mesin penapis pasir dilengkapi dengan corong sebagai laluan untuk pasir halus jatuh. Apa yang perlu kita lakukan ialah letak kereta sorong di sebelah penapis pasir dan pasir akan terus masuk ke dalam kereta sorong. Ia berbeza dengan penapis pasir tradisional di mana pasir halus jatuh ke tanah dan kita perlu memasukkannya ke dalam kereta sorong. Ia akan menggunakan lebih banyak tenaga pekerja binaan. Yang paling penting ialah mesin penapis ini mudah untuk bergerak dalam kawasan pembinaan kerana ia dilengkapi dengan dua roda yang sesuai. Ia akan memudahkan pekerja binaan untuk menapis pasir di satu tempat ke tempat yang lain.

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## **CHAPTER 1**

### **Introduction**

#### **1.1 Introduction**

The project that we intend to implement for the final year project is a sand filter machine. This idea came about when we saw the difficulties of contract workers who needed to build sand filters on their own using the wood. It has wasted energy consumption as well as time as it is necessary to build the filter before it can be used. Additionally, the sand filters use a lot of energy as users need to take the sand and dump the sand on the filter nets. After that, the filtered sand would have to be taken again using a sand shovel to be placed in a stroller and taken to a site that needs to use the fine sand. With that we think of an innovation to reduce the energy and time of contractor workers by creating a sand filter machine that uses engine power to get the good qualities of sand. By using an existing sand filter, contractor workers do not get the good qualities of sand because the filter has only one layer of filter net. Furthermore, filtered sand with existing sand filters will mix with foreign objects because the sand falls on the ground there is nothing to lining the sand. With the machine we wanted to create this, filtered sand could be inserted into the wheelbarrow. With that, sand will not mix with foreign objects and it can also save energy.

The sand filters we want to create will help contractor worker to facilitate their work. Manpower can be reduced when using this sand filter machine. We put two wheels on this machine so that the machine is easy to move on the construction site. This filter machine we put three different types of filter coating so that it can get good qualities of sands. We use the vibrator engine to vibrate the filter part so that the sand can descend quickly.

## **1.2 Background of Study**

This study is deal with the generating a new idea to produce a sand filter machine with new design. Producing sand filter machine for small building's construction and household because of some problem that occur. Plus to realize our goal in technological advances based on modern principles. Explosive ideas based on statement of problems that have been recorded from studies on quality of fine sand and workload used. Many things and research support us to create this product as our main project. We create and upgrade a product that can filter the quality sand without mixing it with foreign matter and reducing the workload of filtering sand. It would be present 2 functions in 1 concept as well.

## **1.3 Problem Statement**

The reason for the idea of building this sand filter is that we have seen contractor workers use their energies in abundance just to get fine sand. They need to build sand filters that need to be made using the used wood to filter the sand. From there, they waste their energy as well as their own time. Additionally, we realize that filtered sand using the existing sand filter will mix with foreign matter because the filtered sand falls directly onto the ground without any reason. We do not know that there are many foreign objects in construction sites such as nails, iron, stone and so on. The existing sand filters cannot be brought anywhere because there is no wheel. It makes it difficult for workers to bring fine sand to areas requiring fine sand. This is because they need to put the sand in the cart beforehand and then bring the sand to where it should be.

## 1.4 Objectives

- Get the good quality of sands

Our goal to build the sand filter machine is to get the good quality of sands. This sand filter machine equipped by a funnel that where the fine sand will dropped into the funnel. After that, the fine machine will dropped into the wheelbarrow that has placed besides the sand filter machine. Contrasts with the traditional sand filter where the sand will drop on the ground. So, the sand will mixed with the foreign things. But, using this sand filter machine will avoid the fine sand from be mixed with foreign thing because the fine sand will drop into the wheelbarrow.

- Reduce workload

Using the traditional way, the constructions workers need to build the sand filter first before them able to use that to filter the sand. That will use lot of workload just to build it. So we build this sand filter machine to reduce the constructions worker workload. Besides, this sand filter machine uses the electric motor that will shake the net. Users just need to put the sand on the net of sand filter machine.

- Easy to moving at construction area

This sand filter machine have equipped by two wheels that can make this sand filter machine able to move easily at construction area. At construction site, the fine sand might be required at different area. So the workers just need to bring this sand filter machine at that place.



## 1.5 Scope

- i. Accommodate 20 – 25 kg of sand - Can accommodate sand for 20 to 25 kg at a time.
- ii. Site construction – For purpose of this sand filter machine can be move in construction site.
- iii. Small building – Suitable to use it for small building like house, hut, mosque and so on.

## CHAPTER 2

### Literature Review

#### 2.1 INTRODUCTION

Sand substance is one of the most important things in industrial world. Nowadays the industry need the sand sub stand that are already been process known as sand product. As we know the sand sub stand are mixtures with variety other component such as dirt and metal.

Usually, people use their hands to sieve sand and absolutely it will take much time to do it. But now, we get some ideas to modify this sieve sand machine by using the power of vibration motor system. With the invention of this sieve sand machine, it can be overcome and makes the construction contractor's work more convenient. It can also be used in the manufacturing of mould industries especially for the sand casting process. By using this sieve sand machine, we can save more time, energy and cost. Indirectly, it will improve the manufacturing qualities. This machine is fixed with wheels, so it is easy to move and to keep. Besides, it is easy to use even by the unskilled workers. Furthermore, it is easy to operate and the spare parts can be obtained easily on the local market Therefore, this machine is suitable to use in the "Industri Kecil dan Sederhana (IKS)" and training institutes such as Polytechnic and MARA Training Institutes (IKM) for training purposes

So to make the process more efficient new technology is needed to help increase the productivity so the human power can be reduce and also can cut the cost of the process.

## 2.2 History Of Sand Filter Machine

From years sand has been the most important thing in human community. Most sediment, including sand, are made up of the fragments that result when rock is broken down by wind and rain (weathering). Generally, they start as larger fragments (gravel), which are broken down as rivers carry them down stream; the finer the particle, the further it has travelled. In other words, large bits of gravel are plentiful on the banks close to the head of a river. As you travel downstream, gravel becomes finer into cobble, pebble, granule, and eventually turning into sand, and finally flowing into the ocean, where these sediments deposit. That is why, by carefully analysing the mineral content and chemical composition of sand on riverbanks, beaches and ocean floors, we are able to determine which formation, indeed what kind of rock, it originated from. Most sediment, including sand, is made up of the fragments that result when rock is broken down by wind and rain (weathering). Generally, they start as larger fragments (gravel), which are broken down as rivers carry them down stream; the finer the particle, the further it has travelled. In other words, large bits of gravel are plentiful on the banks close to the head of a river. As you travel downstream, gravel becomes finer into cobble, pebble, granule, and eventually turning into sand, and finally flowing into the ocean, where these sediments deposit. That is why, by carefully analysing the mineral content and chemical composition of sand on riverbanks, beaches and ocean floors, we are able to determine which formation, indeed what kind of rock, it originated from. Most sediments, once formed in the ocean, sub duct to the Earth's interior (mantle) from trench with a sub ducting tectonic plate. However, some pieces tear loose from the whole, and accreted to the hanging wall continental plate, once again becoming part a continent. Geological structures formed in this way are called accretionary bodies (prisms). Accretionary bodies are characteristic to the subduction zone like Japan, which make up a large part of the Japanese islands Formations and rocks form and break down, form and break down, again and again. During that process minerals also break down and alter, even transform into other minerals, again and again. However, some stubborn minerals simply ride these cycles out, refusing mechanical breakdown or chemical alteration at all. These minerals bear the marks of the processes of geological

history. By carefully analysing them, geologists are able to infer the geological history of the earth itself. Most sediments, once formed in the ocean, sub duct to the Earth's interior (mantle) from trench with a sub ducting tectonic plate. However, some pieces tear loose from the whole, and accreted to the hanging wall continental plate, once again becoming part a continent. Geological structures formed in this way are called accretionary bodies (prisms). Accretionary bodies are characteristic to the subduction zone like Japan, which make up a large part of the Japanese islands. Formations and rocks form and break down, form and break down, again and again. During that process minerals also break down and alter, even transform into other minerals, again and again. However, some stubborn minerals simply ride these cycles out, refusing mechanical breakdown or chemical alteration at all. These minerals bear the marks of the processes of geological history. By carefully analysing them, geologists are able to infer the geological history of the earth itself.



Figure 2.1 Traditional sand filter

The figure 1.1 above show the process has been use by people before us the ancestor way to sieve the sand. And collect the sand they wanted. This process sieve the sand into it size depending on the size of the net been used. This smooth sand or the product usually uses as main material in construction to build building or house. Smooth sand is required to achieve better quality product example in making sand casting or making any product based on sand.

### 2.3 Sand

Sand is a quartz-based material. The sand is practiced sized between 4.75mm and 0.15mm are common sand used to produce concrete and plaster. According to research, sand are available from mines or rivers. The sand mining is sand which was excavated from the mine. This sand is widely used and usually divided into two types, namely fine and rough sand. Fine sand which contains little soil is usually used for mixing along with fine sand from rivers and cement. The mix produces a mixture of plastic and easy to attach although its strength is somewhat less. Coarse sand is suitable for use to combine concrete and make blocks and cement bricks. According to research, river's sand its quality is good and does not contain excessive impurities. Concrete mixing using sand the river is harder to work. Therefore the additives are named facilitators are sometimes used to improve workability. If the mixer is not used, the mix need more cement to get that work pleasures same. Sand obtained from seafrent is not suitable for use. The beach sand contains salt that will cause a pelvic event on the building's surface.



Figure 2.2 Sand

## 2.4 Comparison of Plates

### 2.4.1 Steel Plate

This steel plate is usually used for the construction of artificial materials because the steel plate has no strength. Usually this steel plate is used as the connector material of building structure building. Due to its strong steel properties making this kind of steel plate hard to shape. And of course the selling price of this steel plate is quite good for every single piece

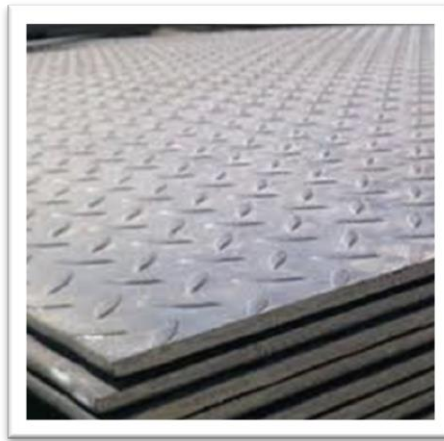


Figure 2.3 Steel Plate

## 2.4.2 Aluminium Plate

Aluminium plates are lightweight and strong sheet plates or metal plates. Aluminium plates have anti-corrosion properties, non-flammable and resistant to any kind of weather. This type of plate itself is easily formed, so widely used in industry as in advertising needs. There are two types of aluminium in it, aluminium cast which can transmit electrical and aluminium forged tensile strength. Aluminium also produces electric conductors that can deliver electricity well, so usually for aluminium plates that are used as raw materials in advertising or advertising industries will be carried out anodizing process is the process of making aluminium does not deliver electricity that is then heated to resist heat or heat water.

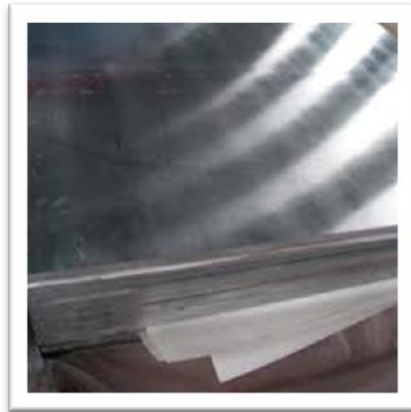


Figure 2.4 Aluminium Plate

### 2.4.3 Stainless Steel Plate

Stainless Steel Plates is a type of plate this one is a stainless steel plate is a plate that is often used in the automotive industry as a material of vehicle bodybuilders and is also widely used as a material of household appliances. Many of the advantages of stainless steel plate are one of them is having a high rust endurance. And many industrial manufacturers do combinations or finishing increasing or producing better stainless steel quality. So we will use this stainless steel for our project.



Figure 2.5 Stainless Steel Plate



## 2.5 Comparisons of Wheel

### 2.5.1 Wheelbarrow wheel



Figure 2.6 Wheelbarrow Wheel

We use wheelbarrow tires as wheels for this sand filter machine moving. We put as much as two wheelbarrow tires to accommodate the load of the sand filter machine as well as facilitate the movement of this machine to move even in a muddy area. In the event of damage to the wheels or the wheel is leaked, it is easy to repair. Additionally, wheelbarrows are very easy to find at any hardware shop.

### 2.5.2 Trolley wheel



Figure 2.7 Trolley Wheel

The trolley wheels are too small and cannot afford to bear heavy loads. The wheels are not able to go through uneven construction areas. The wheels are also durable and easily to broke.

### 2.5.3 Bicycle tyre



Figure 2.8 Bicycle Tyre

This tyre is also capable of being used as a wheel on our sand filter machine. But there are some factors that negate the suitability to apply as a wheel on our machine. Among the factor is because the sizing of this tyre was too big. Besides that, the width of this tyre is not suitable to use at construction areas. The rubber of this is very thin and easy to leak when used at construction site. This is because at the construction site, there are many sharp objects like nails, stones and so on. The rim also cannot accommodate overloaded loads.

## 2.6 Wheelbarrow frame



Figure 2.9 Wheelbarrow Frame

We use a wheelbarrow frame as the backbone of this sand filter machine. We changed the wheelbarrow frame that has one wheel to two wheels. The sand filter and vibrator motor are put on the wheelbarrow frame.

## 2.7 Electric motor



Figure 2.10 Electric Motor

This electric motor use to shake the filter at this sand filter machine. This motor speed is in 1500 rpm and 4 UF. There was an adjustable to adjust the speed.

## 2.8 Sand filter net

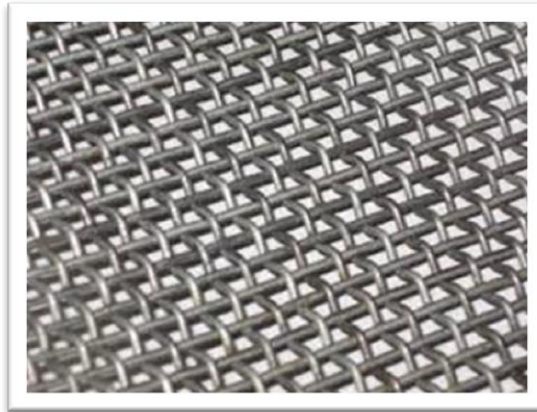


Figure 2.11 Sand Filter Net

This sand filter machine uses the sand filter net with suitable size. The size of the sand filter net's particle hole not too big and not too small. So the sand might able to go through over the net.

## 2.9 Summary

In this chapter, we talk about the history of sand, sand, and materials we will use to make our products. A careful study is made to identify the materials used to make our products appropriate into the costs we estimate. The material that we identify is affordable with the cost we spend.

## **CHAPTER 3**

### **Methodology**

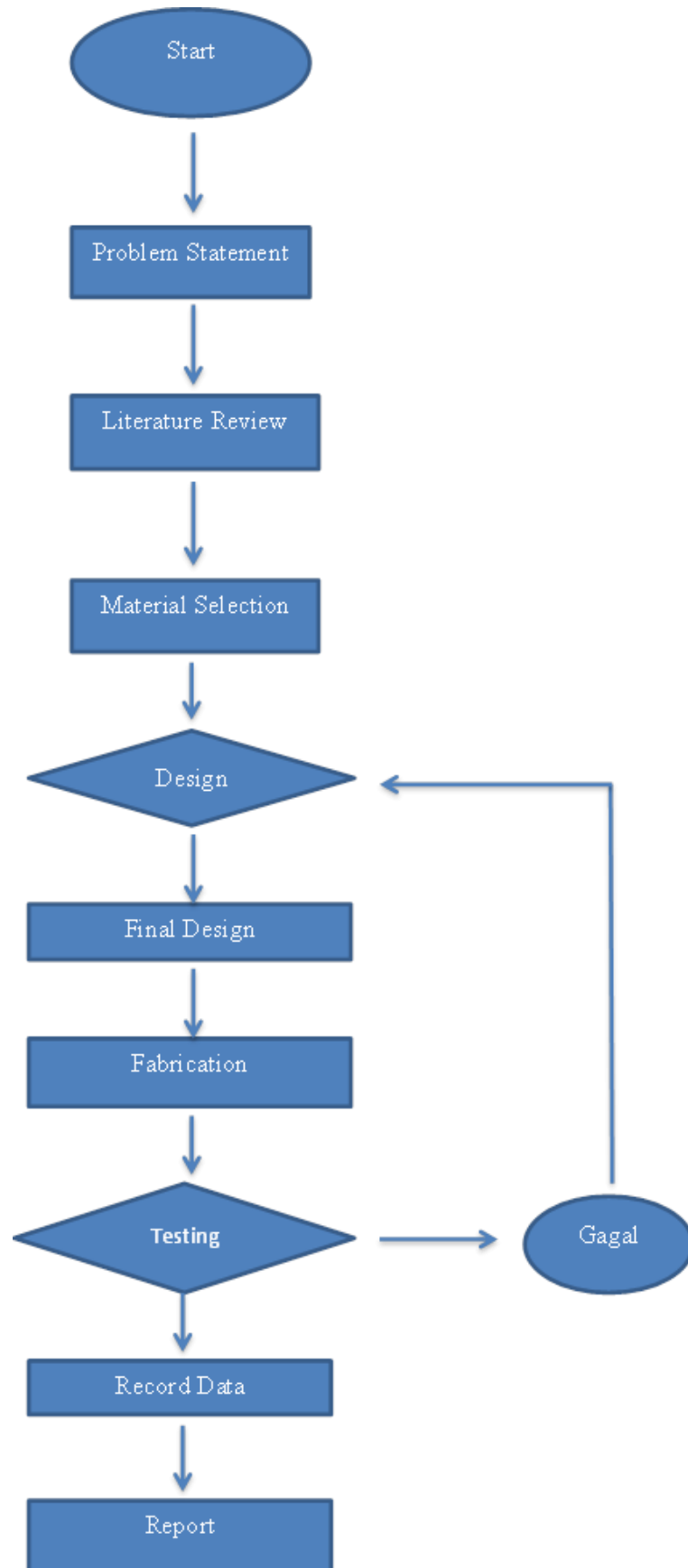
#### **3.1 Introduction**

This chapter will cover the detail explanation of methodology that is being used to make this project complete and working well. Many finding from this field mainly generated from research of other to improve this project.

Methodology is the process of preparing a project that you want to create. Design method or methodology is one of the methods used in developing or designing a project. The methodology used is to help create a creative and innovative project to achieve production objectives in the final project. The design of this machine takes into account all aspects and must also meet the needs of the user to make sand separation in a construction. The design you have created is not that complicated. In addition, the design of the "Modern Sand Filter" project tool is also easy to understand because it has its own basic parts. The size and balance of this project have also been taken into account to facilitate the learning session.

#### **3.2 Flow Chart**

The diagram shows the flowchart of the process for the success of this project. In addition, there are also several steps to be taken as well should be followed in implementing this project. The step is as shown in figure. From the charts of this flow, the activity record for the success of this project can be done smoothly and consistently.



### **3.3 Design Process**

The inventive process is part of the work which needs to be done to create a new project or modifications to a project or better known as process improvements. Some of the necessary steps done in the inventive process are:

- i. Identifying problems.
- ii. Creating ideas
- iii. Design and selection of projects.
- iv. Project planning

#### **3.3.1 Project Selection**

In the process of project selection, criteria and certain factors should be emphasized in terms of selection of materials, costs, and security. The material used must match with the product generated.

### 3.3.2 Project Planning

The process of forming the appropriate framework and manufacturing techniques as well need careful planning and planning because of its structural to be made in line with the product among which review the requirements appropriate equipment and materials, material selection of the economy, and quality and user-friendly. To plan a project-making process this requires a neat plan to be able to conform to what is required in addition to saving costs so there is no available a faulty execution or purchase of excessive equipment implementation of this project.

## 3.4 Research Design

### 3.4.1 First Design



Figure 3.1 First Design

This is the first design of our project. But after having a discussion with our supervisor, this design is irrelevant to being created because it is difficult to filter for sand.



### 3.4.2 Second Design

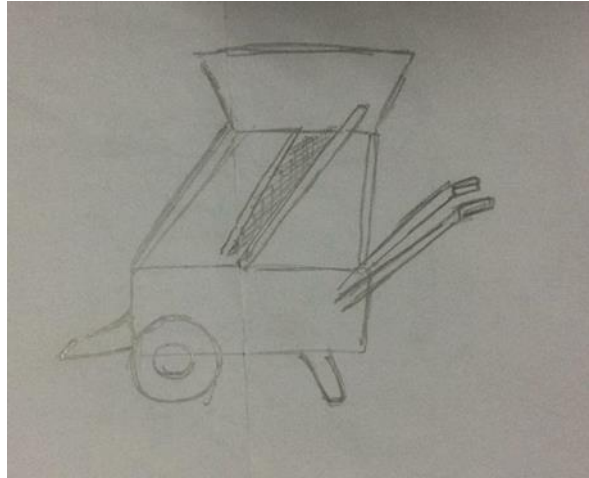


Figure 3.2 Second Design

This is the second design for our project. There have been improvements made for this second design. But once we reviewed it, we looked at it more thoroughly and all the discussions had been made, we decided to create another design for our project.

### 3.4.3 Third Design

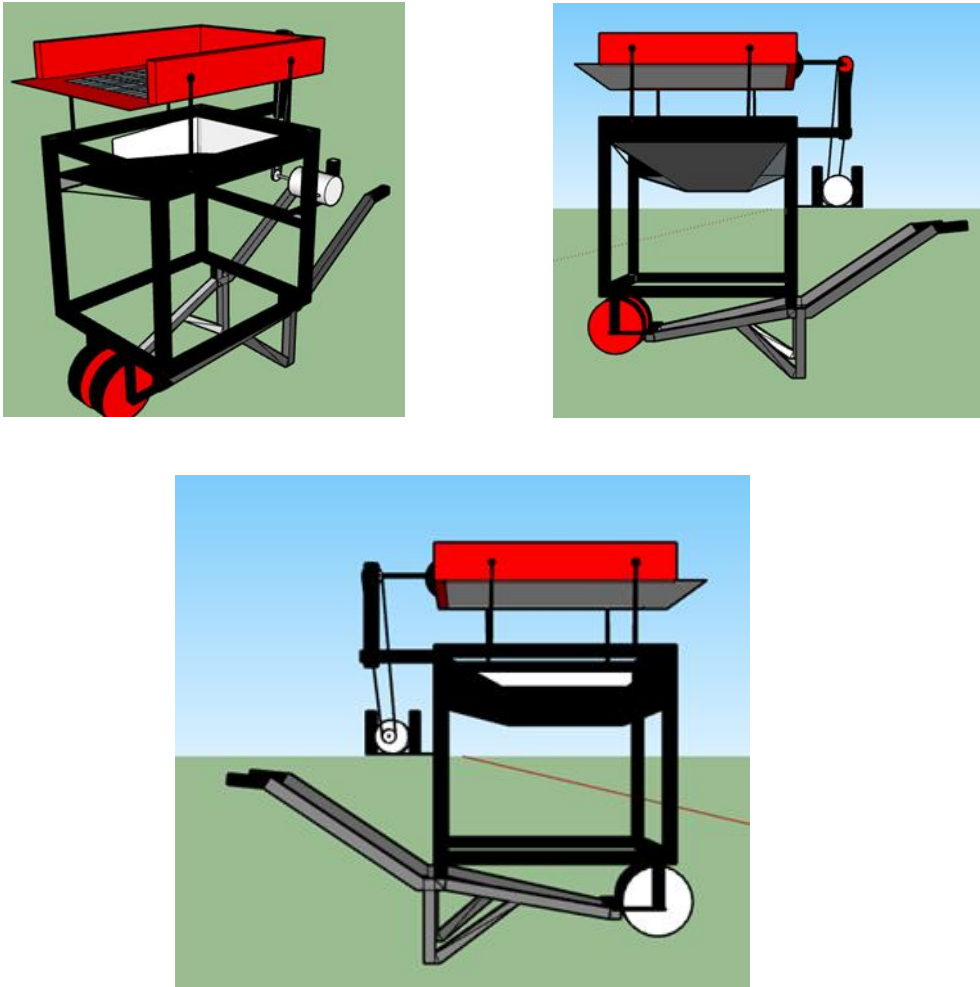


Figure 3.3 Third Design

The third design is our final design that we will choose. Based on our discussion with each other and our supervisor, we make decision that we will take this design as our last design.

### **3.5 Data Collection Method**

Collecting Data and information the level of data collection and information at one stage is very important in producing a perfect report. The failure to obtain important information that will further strengthen the desired outcomes will indicate the weakness of the project being undertaken to obtain unsatisfactory results. Therefore, the process of collecting this information or important data needs to be done continuously throughout the course of this study to ensure that the latest information is obtained and re-use this final report.

In the early stages, we made research to choose the appropriate title and place of study to be conducted. Once the title and place of research have been agreed upon, discussions to identify the objective objectives and scope of the study are carried out. Additionally, issues related to the problem of getting fine sand do the construction site.

In the next stage, initially activities were conducted on the search of data and gathering relevant information in order to further strengthen our stand and identify real problems that occurred. Collected data can be divided into two types, namely primary data and secondary data. Primary data is about searching data from observations, interviews of various parties, visits in construction areas and so on. While secondary data is data search from reports, internet sources, books on sand filters.

We also have discussions with our supervisors for improvement and discussion on the information obtained.

### **3.6 Research Instrument**

This research is based on qualitative and quantitative methods. There are some instruments or instruments used to get the data are survey, observation and interview no structured. The selected questionnaire test instrument is to get the data in this research while interviews and observations are to reinforce the findings of the research.

#### **3.6.1 Survey**

We have created a questionnaire survey through the internet. We ask a few questions to answer as data that we will use for our project. This questionnaire was conducted on the respondents of the survey to obtain data and information from the public about the existing sand filters as well as the filter machines we will create. The questionnaire instrument is considered appropriate in preparing this project to obtain the perfect data. This questionnaire was created to review the effectiveness of our idea to build a sand filter equipped with a vibrator machine. Questionnaire also facilitates researchers to record data and then analyses the data.

### 3.6.2 Observation

In addition to the methods described above, we can also to obtain data through the assessment and observation of the researcher in the research area. Some information on how far the effectiveness of existing sand filters used by construction workers. Through observation, we have identified the problems that exist in the process of obtaining fine sand and feedback provided by the respondents throughout this process.



Figure 3.4 Research Area/ Construction Site

### 3.6.3 Interview

This research also got information by using interview method. The purpose of the interview was to measure the reliability of the questionnaire. The items in the questionnaire related to the construction workers' perception of the method for obtaining fine sand are the basis of interview questions. Interview questions are unstructured. An interview sample consists of several construction workers (respondents). These interviews are aimed at gaining insights on how to get fine sand from the existing sand filters they currently use. This friendly interview touches on issues such as the problems that arise and the constraints of the process of sand filtration. In addition, several proposals have been proposed by us as well as by the respondents.

### 3.7 Data Analysis

After successfully collecting as much data, we analyse the data we have acquired. Our survey through the website has been done to get the data and views from the public. Some questions have been answered for respondents. Among the questions we are concerned about is the use of our sand filters in the future. Most of those who answered our survey questions seemed to agree when our products were marketed for the future. In this regard, we should improve the effectiveness of our products so that they can be used in the future. After analysing the data, there are also some problems identified. Criticism and suggestions are made and then presented to lecturers. When the presentation is completed, a review of the data and suggestions and criticisms has been given to improve the weaknesses and further strengthen our stance on our projects.



Figure 3.5 Lecture Give Criticism and Suggestions

### 3.8 Progression Work

#### 3.8.1 Design Process

The design of this product was sketched using Sketch Up the design is being realize. After getting agreement from all team member and supervisor.

#### 3.8.2 Buying wheelbarrow



Figure 3.6 Wheelbarrow

The first material that we have to find is wheelbarrow. We bought it at hardware shop in TTDI Jaya. We bought the wheelbarrow because we want to take the wheelbarrow's frame and wheel. At the same time, we also bought another one wheelbarrow's wheel.

### 3.8.3 Cutting Process Base On Measurement



Figure 3.7 Cutting The Steel

In cutting process, we do cut the plate and steel according to the size and measurement that has been determine. We use the disc grinder to cut the plate and steel.



### 3.8.4 Welding Process



Figure 3.8 Welding Process

After we cut the steel and plate, we go to welding process to build the sand filter machine. We combine the part by part according to our design and we welding it.

### 3.8.5 Putting Motor System

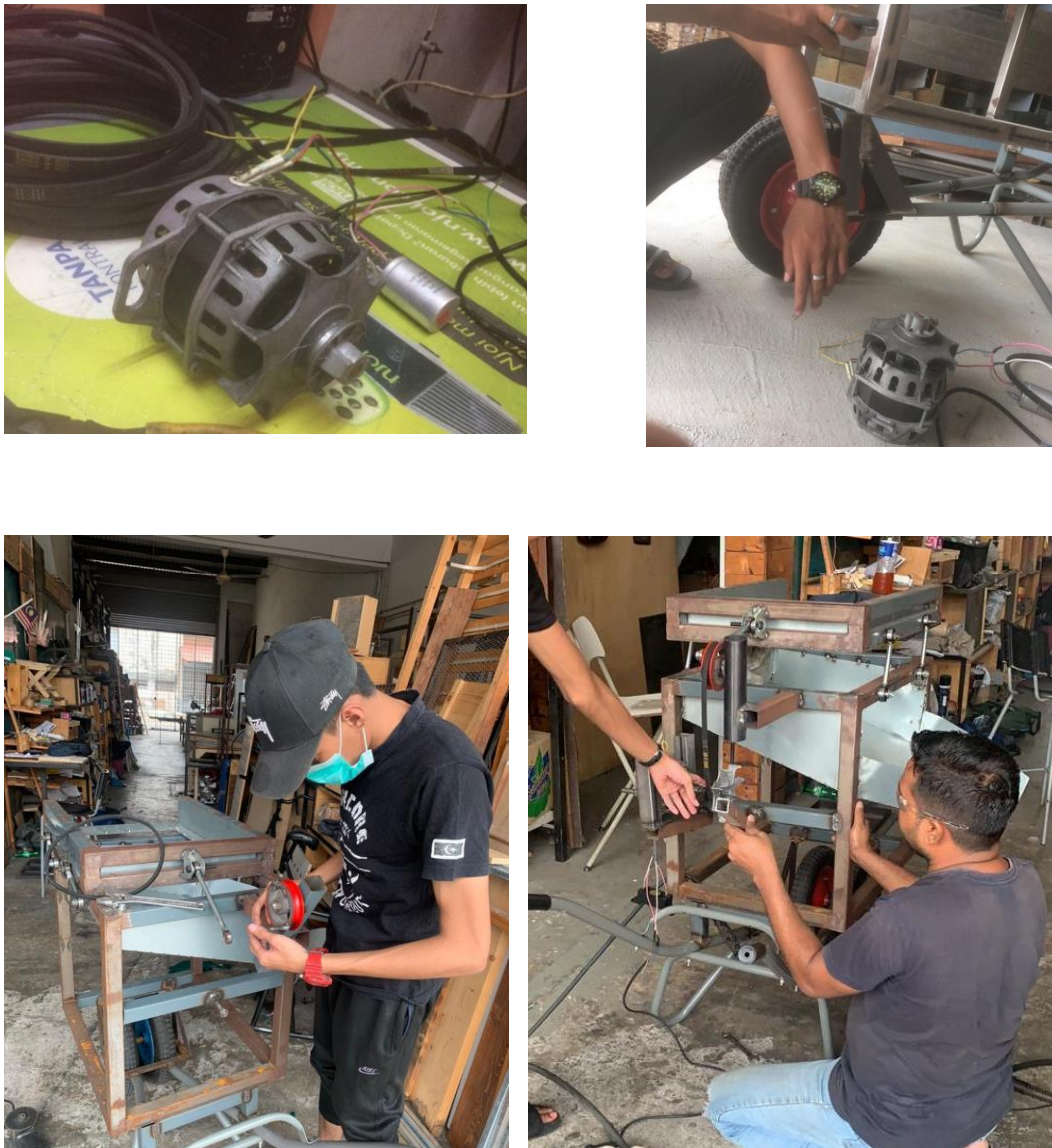


Figure 3.9 Putting Motor System

We do the wiring work to make sure that the motor can works like what we want. After that, we put the motor to the sand filter machine. The motor has equipped with a belt and pulley.

### 3.8.6 Finishing

#### 3.8.6.1 Remove Rust



Figure 3.10 Remove Rust

To get the smooth surface of steel, sand paper were used to removing the rust at the steel. It will make the product looks more beautiful and interested.

### 3.8.6.2 Colouring



Figure 3.11 Sprays/ Colouring The Product

After we done of removing the rust, we let the sand filter machine get dry first before we proceed to spray the sand filter machine. In a few minutes the sand filter machine have dry. We start our task by colouring the product. We just use two colours in colouring the product. The colour is red and black. We think that colours are suitable for this product and look interested.

### 3.8.6.3 Install Part Back



Figure 3.12 Installing The Part of Product

After done of colouring, we install the part by part of this sand filter machine back.

### 3.9 Summary

Overall for this chapter, we have collected data with various methods to complete our project. The data and information collected must be correct and accurate so that the project can run perfectly. For this chapter, we get a lot of data and suggestions from various parties. With that, we can continue our progress for our projects. With the availability of data and information as well as suggestions from various quarters, it can help our project to be perfect.

## **CHAPTER 4**

### **Result**

#### **4.1 Introduction**

The product that has been produced must be able to give the benefits to the customers or users where the product has its own quality and function. For example, product design must be in term of design either in shape, colour, and design that can give the attractive to the consumer or users.

To ensure the product that from sand filter machine as main material is good and suitable for making a sand filter machine, the questionnaire was create to know the opinions and views of the consumer of respondents that can give the contribution for positive impact on the product that was produced.

#### **4.2 Rate of response**

We have make questionnaire that have distributed using google form. There were 43 people that have response to our questionnaire to know the ability and how far our product can use in construction field. Among our respondents, there were construction workers, contractor, and household. They come in different gender that man and women.

### 4.3 Demographic Profile of Respondents

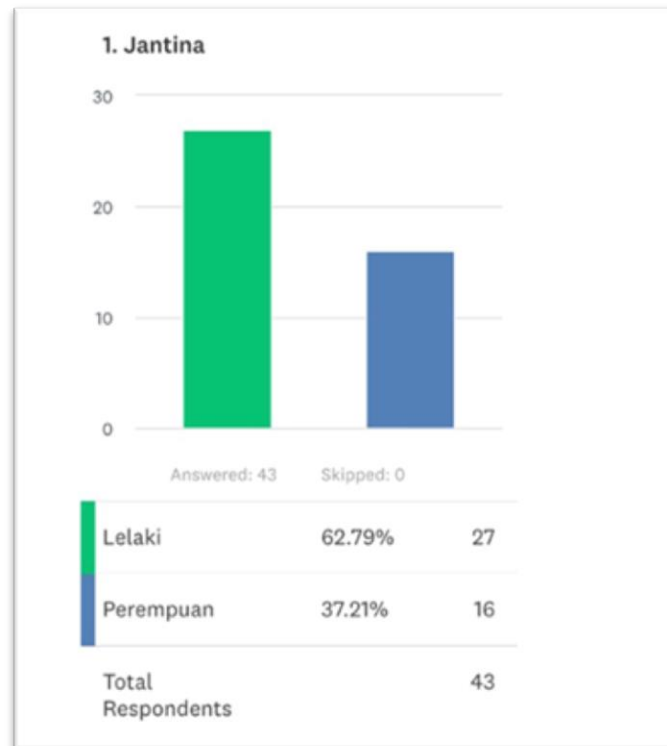


Figure 4.1 Gender of Respondents

Figure 3.5 shows the numbers of respondents that have given their response to our research that we do. There were 62.79% of respondents is come from men that is 27, while 37.21% of respondents come from women that is 16. The amount respondents of men are higher than women. This is because most of construction workers and contractor is men.

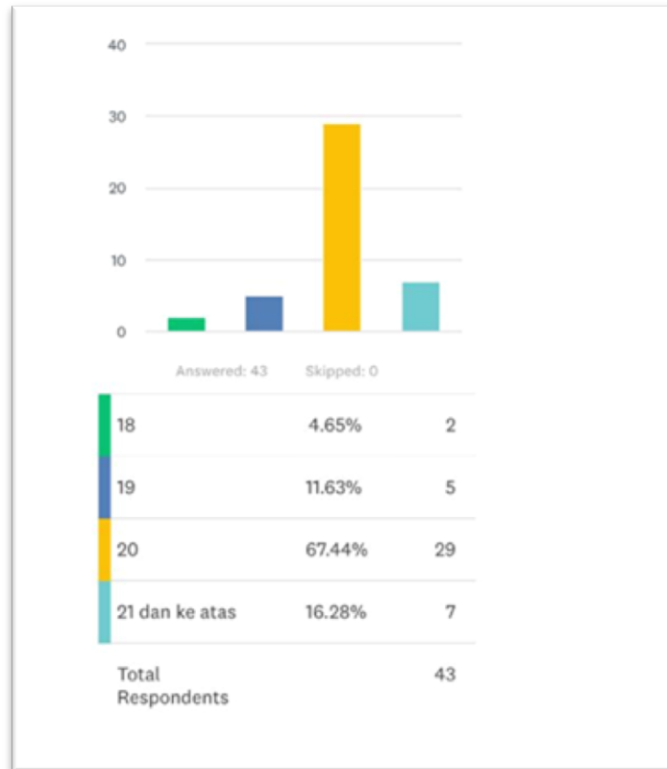


Figure 4.2 Age of Respondents

Next, Figure 3.6 shows the result from research found that 2 respondents is aged 18 years old that is as much 4.65%. Meanwhile, 5 respondents is aged 19 years old that is as much 11.63% and respondents that aged is 20 years old as much 29 persons that is 67.44%. And the rest is aged from 21 years old and above that is 7 respondents from there represent to 16.20%.



## 4.4 Research Result

### 4.4.1 Knowledge About Sand Filter Machine

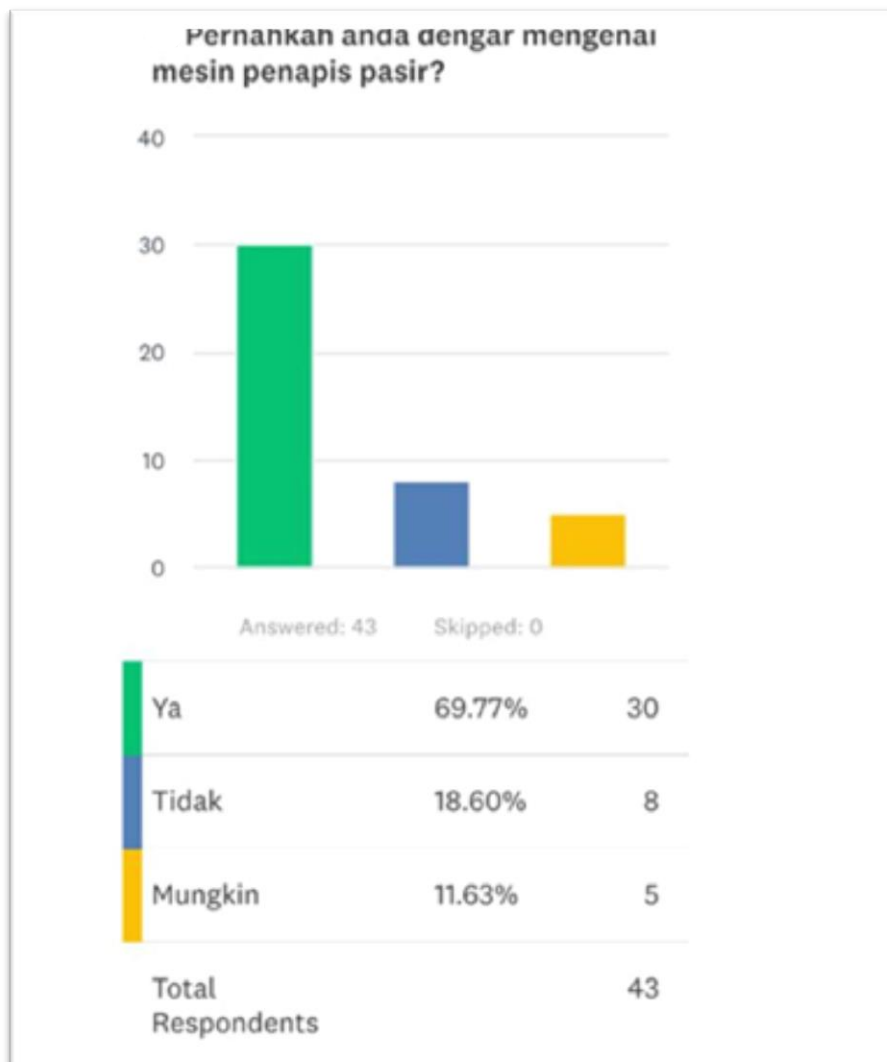


Figure 4.3 Question 1

Based on the research, 69.77% of respondents answered Yes to the question shows that they know about the sand filter machine that used for filtering the sand to get the good quality of sand. Sand filter machine should be washed after using that for filtering the sand. Most of respondents give the positive response to our question.

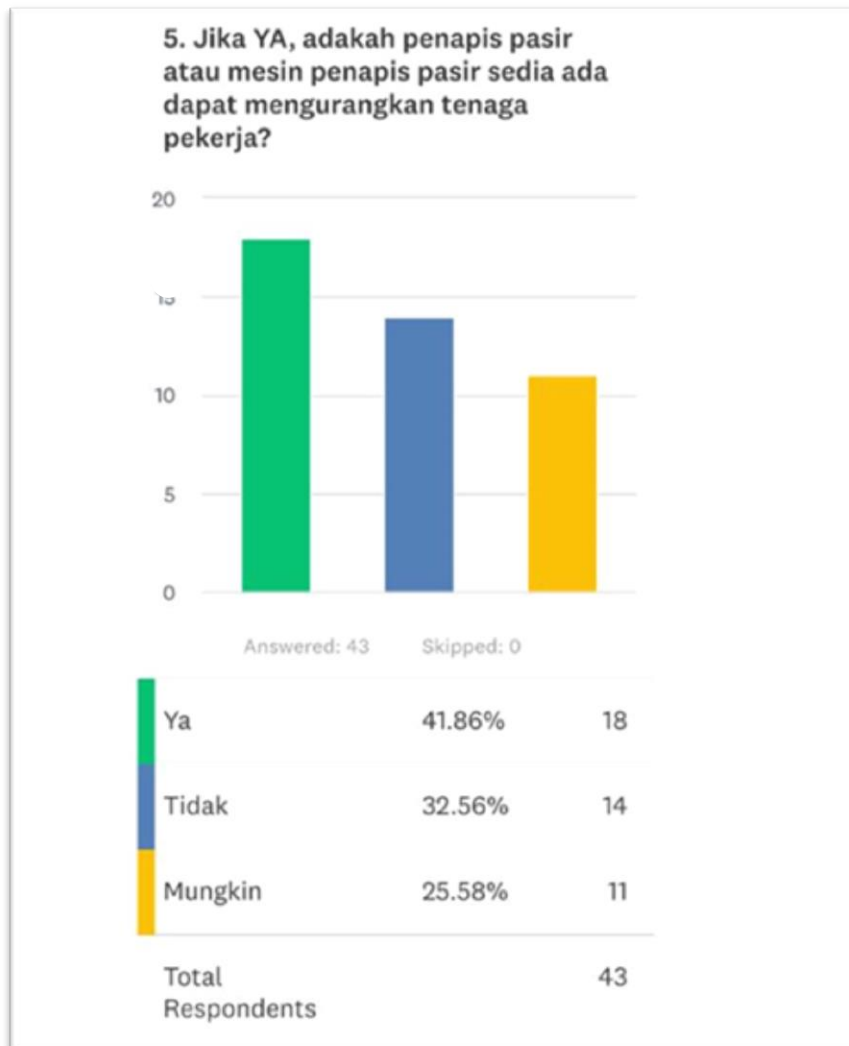


Figure 4.4 Question 2

Based on research, 41.86% from the respondents agree that sand filter machine can reduce the construction workers workload. That is because, the sand filter machine will work to filtered the sand using the shaker system. The electric motor will produce the shaker and sand will be filtered by its own. Furthermore, the sand filter machines have a funnel as a way for sand throughout and dropped into the wheelbarrow.

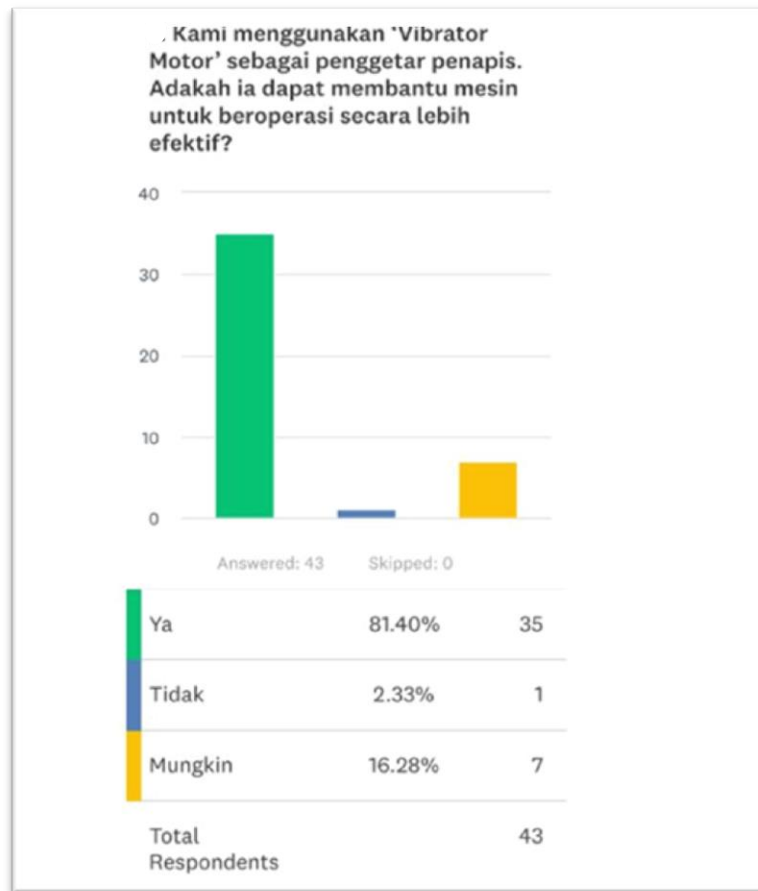


Figure 4.5 Question 3

Based on the research, a total of 35 respondents from 43 respondents with 81.40% agree that using the electric motor as a shaker to the filter will make the sand filter machine to operate with more efficiently. So we will approve to use the electric motor at our product as much as it can help the sand filter machine to work with efficiently.

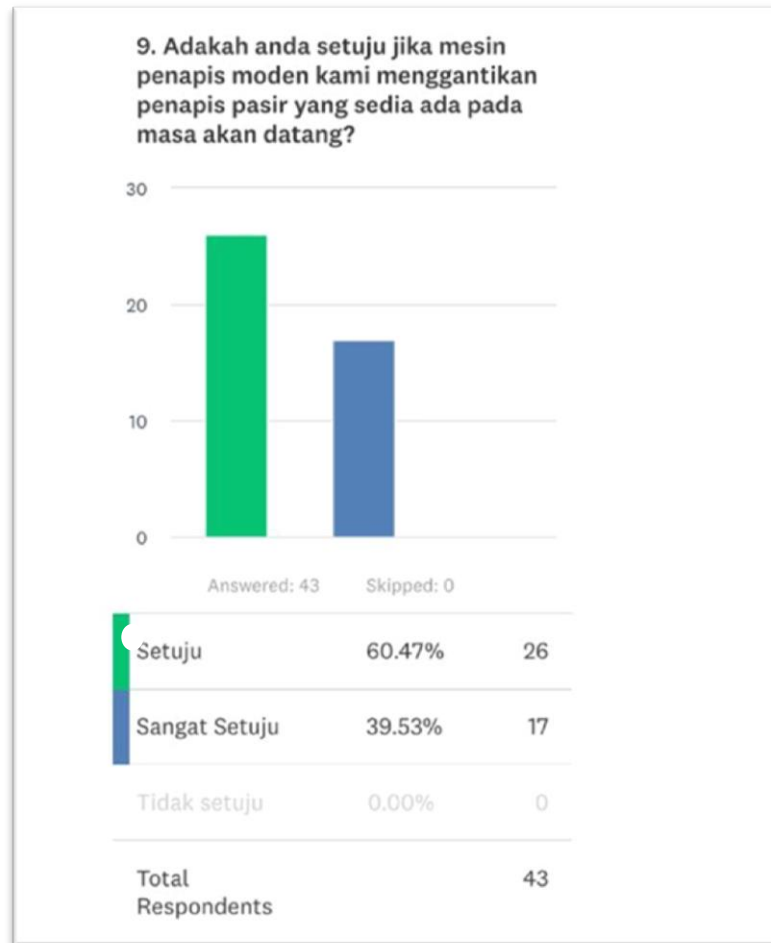


Figure 4.6 Question 4

Based on the research, total 26 respondents with 60.47% seems agree with if our sand filter machine to replace the existing traditional sand filter in the future. Its mean like our product will acceptable in market. Besides that, looks very agree with our product to be used in future.

## 4.5 Summary

As a overall, our product *Sand Filter Machine* is very suitable to be use in future as replacement the manual way or traditional way that always been used until now.

Besides that, this product has achieved the objective that we wanted that is to get the good quality of sand, reduce workload, and can be move in construction site.

Lastly, as the result from this research, we found that the percentage of respondent to our product is very high. This shows that our product is acceptable from society and its advantage as a product that with high innovation.

## **CHAPTER 5**

### **Discussion and Conclusion**

#### **5.1 Introduction**

This chapter explain about the project that has successfully completed in about 6 month equivalent to one semester. Besides that, there were some problems that we have to face along our process to installation and testing for our product. Therefore, there have some suggestions to improve our project in the future that will give benefits to the users. In this chapter, the decision has been made based on the overall decision that we got from the research and discussion in the previous chapter before this. Besides that, in this chapter also, the related matters that are relate to the objective and also the suggestion from the research that we have made. With that, the conclusion has been made to our research.

## 5.2 Discussion

For our project, *Sand Filter Machine*, this product was tested by constructions worker. When our product was tested, our product can produce a good result as well. Our products are successfully to achieve the objectives that we have been set. Among them is, our product can get the good quality of sand when we use it to filter the sand. The fine sand that we got from using the traditional sand filter can mix with the foreign things because the fine sand the have been filtered will drop on the ground. As we know those maybes there were many foreign things on the ground like nails, stone, and others. Our sand filter machine has a funnel that as the way for fine sand to drop into the wheelbarrow. Besides that, our product also can reduce the workload of constructions worker. This is because, the constructions worker don't need to waste their energy just to build a traditional sand filter. They can just keep their energy for any works that more important. Moreover, using the traditional sand filter will use more energy or workload. This is because the constructions worker need take the sand that have drops on the ground and put it into the wheelbarrow. Next, traditional sand filter cannot or difficult to move. Traditional sand filter no have the wheel. But, our sand filter machine, we put the wheel, so it can be move easily in construction site.

### 5.3 Suggestion

After us running this project, we found that our project can give benefits to the users because this product can reduce the workload of constructions workers compared to traditional sand filter. Besides that, finishing that we do to our product is more neat and productive compared to traditional sand filter that just use the used wood to build the sand filter.

To overcome the weaknesses of this project, several suggestions have been made:-

- Use the motor with the rpm in about 1300 rpm.
- Put the funnel to more leaning, so the sand can drop easily to the wheelbarrow.
- Use the filter net with more thickness.
- Use the wheelbarrow's wheel with the same size that makes the sand filter machine is more stable.



## 5.4 Conclusion

Every project that is done have their own benefits and objectives. Same like our project '*Sand Filter Machine*'. There were no troubles when we do this project and the objective for this project finally can we achieve.

This project can filter the sands with the good quality of sand for the result with using the electric motor helps with 4-5 UF and the speed in about 1300 rpm that is suitable for this project. This project achieves the objective that is to get the good quality of sand without mix with foreign things compared with using the traditional sand filter.

Besides that, this project is more attractive and the size is suitable for construction surrounding. Furthermore, this project can be removing part by part, so it will more ease to bring it to everywhere. These sand filter machines also easy to handle even the users have no experience to use it.

Based on the result of research in creating and finishing this project, we found that the project's objective for this product have achieved with successfully. Besides that, it can give benefits to many party especially constructions worker and contractor where it can help to reduce the workload usage of constructions worker and got accepted from contractor for this product to be commercialized in industry sector.

Lastly, we hope this project can be fully utilized, accepted and can be applied and suitable with technological development nowadays. Besides that, we also hope that this product will give the best result to the users and it can fulfil the requirement of all users.

## **APPENDIX**

**APPENDIX A**            **COSTING PROJECT**

**APPENDIX B**            **PERMISSION LETTER TO DO TESTING**

**APPENDIX C**            **DRAWING AND DESIGN**

**APPENDIX D**            **GANTT CHART**

## APPENDIX A

### 1. COST PROJECT

No.	Materials	Quantity	Price Per Unit	Total (RM)
1.	Wheelbarrow	1	RM80.00	RM80.00
2.	Wheelbarrow wheel	1	RM28.00	RM28.00
3.	Hollow steel	3 x 2m	RM65.00	RM195.00
4.	Stainless steel plate	1 (1m x 1m)	RM70.00	RM70
5.	Net	2 feet	RM5.00/feet	RM10.00
6.	Electric motor	1	RM180.00	RM180.00
7.	Belt	1	RM10.00	RM10.00
8.	Pulley	1	RM28.00	RM28.00
9.	Nut/Screw	30	RM0.50	RM15.00
10.	Bearing	10	RM5.00	RM50.00
11.	Sub	5	RM11.00	RM55.00
12.	Spray	3	RM12.30	RM36.90
13.	Sandpaper	3	RM1.00	RM3.00
<b>TOTAL</b>				RM760.90


Table 1 Material's Cost

## 2. LIST OF COMPONENT


- |                          |                   |               |
|--------------------------|-------------------|---------------|
| 1. Wheelbarrow           | 6. Electric motor | 11. Sub       |
| 2. Wheelbarrow wheel     | 7. Belt           | 12. Spray     |
| 3. Hollow steel          | 8. Pulley         | 13. Sandpaper |
| 4. Stainless steel plate | 9. Nut/Screw      |               |
| 5. Net                   | 10. Bearing       |               |

## APPENDIX B

### 1. PERMISSION LETTER TO DO TESTING



POLITEKNIK SULTAN SALAHUDDIN ABDUL AZIZ SHAH  
KEMENTERIAN PENDIDIKAN MALAYSIA  
Persiaran Usahawan, Seksyen U1  
40150 Shah Alam  
SELANGOR, MALAYSIA



**POLITEKNIK**  
MALAYSIA  
SULTAN SALAHUDDIN ABDUL AZIZ SHAH

---

Rujukan : PSA/JKA/02/07/002 Jld 4  
Tarikh :

kepada:

**Sesiapa Yang Berkenaan**

Tuan/puan,

**KEBENARAN MENGUMPULKAN MAKLUMAT KAJIAN BAGI PELAJAR KEJURUTERAAN AWAM, POLITEKNIK SULTAN SALAHUDDIN ABDUL AZIZ SHAH**

Dengan segala hormatnya perkara di atas adalah dirujuk,

2. Adalah dimaklumkan bahawa pelajar politeknik ini perlu mengumpulkan maklumat kajian bagi memenuhi keperluan kursus yang sedang diikuti yang merupakan salah satu syarat penganugerahan diploma.

3. Butiran kajian dan pelajar yang terlibat adalah seperti berikut:

KURSUS	DCB 6194 : PROJEK 2		
TAJUK	MESIN PENAPIS PASIR		
BIL	NAMA PELAJAR	NO MATRIK	NO TELEFON
1	MUHAMMAD NAZRUL NAIM BIN MOHD FAUZI	08DPB17F1166	014-2944621
2	MOHAMAD HAZIQ FIKRY BIN HAZLAN	08DPB17F1221	014-8040533
3	MUHAMMAD RIDWAN BIN MOHAMAD JOHARI	08DPB17F1242	018-2078639
4	MUHAMMAD ALIF HAIKAL BIN SAHARIN	08DPB17F1124	011-27144984

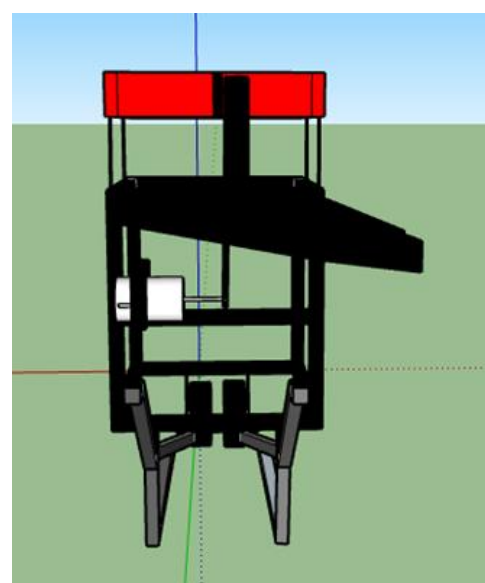
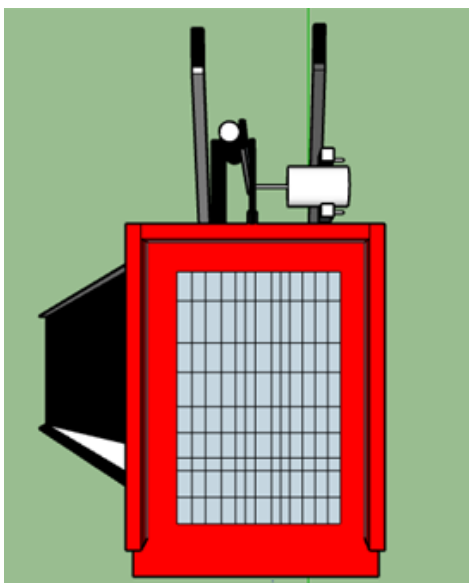
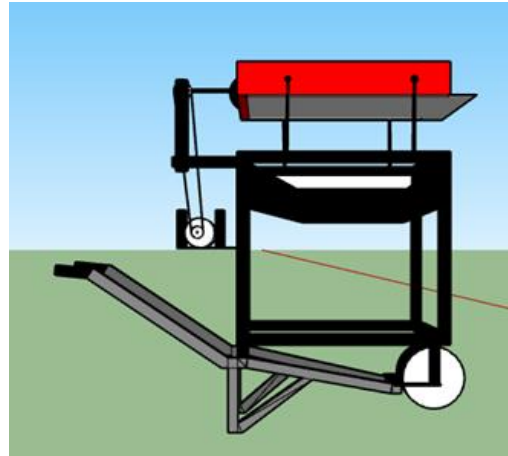
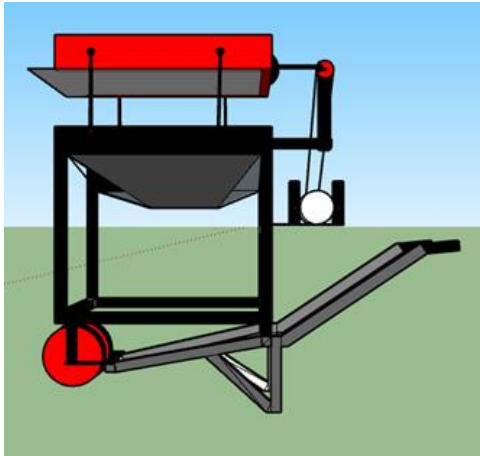
4. Sehubungan dengan itu, kerjasama dari pihak tuan/puan amatlah diharapkan untuk membenarkan pelajar tersebut bagi mendapatkan maklumat kajian yang berkaitan. Sekiranya terdapat sebarang pertanyaan, tuan/puan boleh menghubungi penyelia bagi projek kami iaitu PN NORMALINI BINTI MANSOR di talian 019-2286408.

5. Segala kerjasama dari pihak tuan/puan amatlah dihargai dan didahului dengan ucapan ribuan terima kasih.

Figure 6.1 Permission Letter

## APPENDIX C

### 1. DRAWING AND DESIGN



APPENDIX D

1. GANTT CHART

Project activity / week	status	W	W	W	W	W	W	W	W	W	W	W	W	W	W	W	W
		1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
Briefing of final year project	Predict	█															
	Actual	█	█														
Discussing and initial proposal	Predict	█	█														
	Actual	█	█	█													
Study of operation	Predict			█	█												
	Actual			█	█												
Survey component	Predict				█	█											
	Actual				█	█	█										
Preparation of proposal presentation	Predict					█	█										
	Actual						█	█									
Material study	Predict						█	█									
	Actual							█	█	█							
Estimation of product cost	Predict							█	█								
	Actual								█	█							
Literature review	Predict									█							
	Actual									█	█	█	█	█			
Preparation of final presentation	Predict									█	█	█	█				
	Actual												█	█	█		
Final presentation	Predict													█	█	█	
	Actual															█	█

Table 2 Gantt Chart

## REFERENCES

1. Yumni Rosli (Feb 08, 2018)  
[https://missmanggo.blogspot.com/2018/02/contoh-kertas-cadangan-proposal-projek\\_4.html](https://missmanggo.blogspot.com/2018/02/contoh-kertas-cadangan-proposal-projek_4.html)
2. Abid Sufian Husin (Jul 13, 2018 )  
<https://edoc.site/contoh-proposal-projek-pdf-free.html>
3. Muhd Mu'izuddin (Jan 09, 2017)  
<https://www.slideshare.net/Muiz1994/final-year-project-report-example>
4. Sieving – Definition & Process Sieving method Of Separation@byjus. (2017, September 20). Retrieved March 10, 2018, from  
<https://byjus.com/chemistry/sieving/>
5. Sieve Analysis. Retrieved March 10, 2018, from  
[https://www.retsch.com/news/details/news\\_details/sieve-analysis](https://www.retsch.com/news/details/news_details/sieve-analysis)
6. Geankoplis, C.J. (2009) Principle of Transport Processes and Separation Processes. 1<sup>st</sup> edition. Pearson Education South Asia PTE. LTD.
7. Alina Carmen Cojocaru , M. Ram Murty, (28 Feb 2006), An Introduction to Sieve Methods and Their Applications, London Mathematical Society Student Texts, CAMBRIDGE UNIVERSITY PRESS, 0521848164