POLITEKNIK
MALAYSIA
MUKAH

GREEN TECH OIL FILTER

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DEPARTMENT OF MECHANICAL ENGINEERING
POLITEKNIK MUKAH

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GREEN TECH OIL FILTER

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This report is submitted to the Department of Mechanical Engineering in partial fulfilment of the requirements for graduation Diploma in Mechanical Engineering

PROJECT REPORT VERIFICATION

This report entitled "**Green Tech Oil Filter**"has been submitted and reviewed as to meet the conditions and requirements of project writing.

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"We declare that this report is our own work except each piece that we have explained the source"

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Lastly, thanks also to all those involved directly or indirectly assist in the production of this project.

ABSTRAK

GT Oil Filter diaplikasikan hasil daripada pemerhatian dan temubual mengenai penapis minyak yang sedia ada. Penghasilan projek ini adalah untuk kegunaan di kantin dan kafe Politeknik Mukah bagi meminimumkan pembuangan minyak ke bahagian longkang utama. Produk ini mampu mengatasi masalah yang timbul daripada penggunaan penapis yang sedia ada. Antaranya ialah bau yang kurang menyenangkan dan pencucian penapis setiap hari. Secara keseluruhannya projek ini menggunakan keluli tahan karat pada bahagian badan dan dikuasakan dengan motor 0.37 kilo watt untuk menggerakkan shaf. Hasil daripada uji lari yang telah dijalankan, projek ini mampu mengasingkan 58ml minyak dalam masa satu minit. Peningkatan sebanyak 50% berbanding penapis minyak sedia ada.

ABSTRACT

This project applied the observations based on interviews about the existing oil filter in PMU. The objective of this project is to design and produce the oil filter system for use in canteens and cafes only. This product to solve some of the problems arising from the use of an existing filter. Such as an unpleasant smell and it's need to clean it every day. The overall project is to use stainless steel for the body and is powered by 0.37 kilo watt motor to drive the shaft. The result after test run of which has been carried out, the project is able to separate oil 58ml within one minute. An increase of 50% compared to existing filters.

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CHAPTER 1

INTRODUCTION

1.1 Introduction

Green technology is the right way to disquiet the population follows the phenomenon of global warming and environmental pollution especially for unpleasant smell from drains. The dirty and smelly environment that will invite various problems such as a decrease in air quality, dengue fever and can bring negative impact on the area. According to the Dictionary of Language and Literature (2003) pollution is an act of polluting cleaning or staining. In the municipality of third world countries, the management of food scraps often have problems.

A variety of ways that have been done to reduce the problem of clogged drains and smelly. Now a day, there are many using drain waste collectors also known as trap leftovers. With this trap, it has open a new dimension to the user in troubleshooting the cause of this contamination. This pollution comes from residential, commercial, office, construction, hospitals, industry and agriculture. However, it is not a trap oil and surely its flows in drains and cause an unpleasant smell. Therefore, oil traps have been added in the existing waste trap to solve the pollution problems occur in PMU.

Based on innovation, creativity and high value added in order to keep the country competitive, pollution is an important element that needs to be addressed. Correspondingly, some of innovation products must be developed to address the growing problems of pollution spreading in daily life.

With the added grease traps in the trap waste, thus also contributing to the development of its own products that have commercial value like the ability to create a product that has its own identity and patents. Patents are a government effort to encourage innovation and protect the designs and intellectual property rights are discovered. While innovation is the specific activities undertaken or carried out by a man with a mind capable of thinking and physical in producing something new discovery. It relates to its surroundings and useful in social life.

1.2 Background Research

The use of grease traps in the trap of waste is an alternative to avoid the bad pollution emanating from the oil that comes from the trenches. The remains of oil is in strategic position the waste trap less effective and cause of oil flowing through the washing water. Some of the oil that flows have been brought an unpleasant smell. It will also invite other problems like attracting the attention of various insect rest such as flies, mosquitoes and others.

There are many shapes and sizes of traps have been developed to block the remaining of food waste and oil. However, the suitable of the waste trap redesign and added value to help consumers. Whereas, with a layer of sparkling water also gives impression that the discharge of oil in the water. Dark green, dirty, smelly and a negative term that is often expressed by society to drain cleaning.

The phenomenon commonly seen now is that a lot of food premises to install grease traps perfectly on the exhaust system. According to the Local Government Act, businesses involved in the disposal of solid waste or liquid waste trap required before water is released into the natural. Residual trapping at least reduce the problems of drainage and unpleasant smell and also the presence of unwelcome insects.

Canteen and cafeteria are the main source for students in PMU. Its location is located in the main routes PMU staff has made it as canteen easy reach. The canteen operation on Monday to Friday during office hours. But there hundreds of PMU will having breakfast and lunch. The situation may be described canteen

generate solid and liquid waste more. It there is no effort to control and contain the waste disposal problem, then it will invite a serious pollution problems.

Furthermore, the design of the waste trap should also have relationship with human being and emphasize the value of ergonomics. Suitability, the design is not only the workability, but also need are appropriate to needs of consumers a listed in the new human environmental factor that related to user need.

A good product will be seen in the level if ability it's left an impression on consumers. Product is an object that can make users feel grateful, comfortable and easy to maintain. Therefore, the design of a product should be compatible with the intended use. Efficient waste trap is a trap that does not prevent the drains even charge a lot and unpleasant smell can be reduce.

In that case, a study of product development trap food waste was added to the oil trap has a design suitability to overcome the problem of pollution.

1.3 Problems Statement

i. $\frac{7}{15} \times 100 = 46\%$mentioned that the filter at PMU's cafe did not work properly.

ii. $\frac{11}{15} \times 100 = 73\%$of 15 employers in PMU'S stating that the existing filter difficult to washed

1.4 Objective

i. To design and produce the oil filter system.

ii. To minimize 50% of the oil mixture in the water coming out of the sink.

1.5 Scope

i. Only conducted on the filter system of waste around the cafeteria and cafe in PMU.

1.6 Summary

This chapter describes the product to be design and produced. GT Oil filter is the one of the project to be produce and design for final project. This products are engineered to reduce air pollution caused by the oil flowing in the drain. This is because the oil filtered in a filter residue cannot be filtered properly. Indirectly, GT oil filter can solve the problems with separating the oil with water. The sources of the problem which has been obtained through interviews with the canteen and cafe in the PMU which states that an existing filter difficult to washed and 85% of employers in the cafe has stated that the filter does not work properly. GT oil filter is used to filter system in the canteen and cafe only at PMU.

CHAPTER 2

LITERATURE REVIEW

2.1 Introduction

A literature review is an evaluative report of information found in the literature related to your selected area of study. The review should describe, summarize, evaluate and clarify this literature. It should give a theoretical base for the research and help you (the author) determine the nature of your research.

2.2 Theory Concept

A grease trap (also known as grease interceptor, grease recovery device and grease converter) is a plumbing device designed to intercept most greases and solids before they enter a wastewater disposal system. Common wastewater contains small amounts of oils which enter into septic tanks and treatment facilities to form a floating scum layer. This scum layer is very slow digested and broken down by microorganisms in the anaerobic digestion process. However, very large amounts of oil from food production in kitchens and restaurants can overwhelm the septic tank or treatment facility, causing a release of untreated sewage into the environment. Also, high-viscosity fats and cooking greases such as lard solidify when cooled, and can combine with other disposed solids to form blockages in drain pipes.

Grease traps have been used since the Victorian days, although Nathaniel Whiting obtained the first patent for a modern-day grease trap in the late 1800s.They are used to reduce the amount of fats, oils and greases (FOGs) that enter the main sewers. Effectively they are boxes within the drain run that flows between the sinks in a kitchen to the sewer system. They only have kitchens waste water flowing through them and are not served by any other drainage system such as toilets. They can be made from a number of different materials; e.g. stainless steel, plastics, concrete and cast iron. They range from35 litre capacity to 45,000 litres and above capacity. They can be located above ground, below ground, inside the kitchen or outside the building.

2.3 Previous Research

Figure 2.1:Grease trap for greywater

A grease trap also known as grease trap interceptor, grease recovery device and grease converter is a plumbing device design to intercept most greases and solids before they enter a wastewater disposal system. Common wastewater contains small amounts of oils which enter into septic tanks and treatment facilities to form a floating scum layer. This scum layer is very slowly digested and broken down by microorganisms in the anaerobic digestion process. Large amounts of oil from

preparation in restaurants can overwhelm a septic tank or treatment facility, causing release of untreated sewage into the environment. High-viscosity fats and cooking grease such as lard solidify when cooled, and combine with other disposed solids to block drain pipes.

Grease trap have been used since Victorian days. Nathaniel Whiting obtained the first patent for a grease trap in the late 1800s. These reduce the amount of fats, oils and grease (FOGs) that enter sewers. They are boxes within the drain run that flows between the sinks in a kitchen waste water flowing through them, and do not serve any other drainage system, such as toilets. They can be made from many different materials, such as stainless steel, plastic, concrete & cast iron. They range from 35 liter capacity of 45,000 liters and greater. They can be located above ground, below ground, inside the kitchen or outside the building.

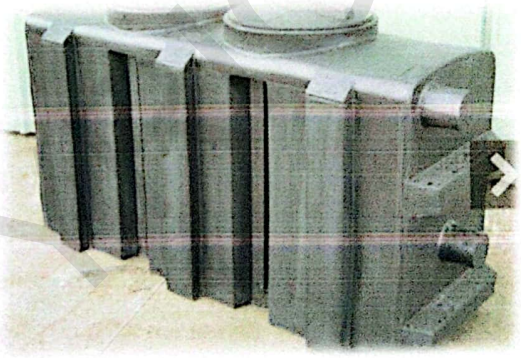


Figure 2.2: Plastic Grease Trap

This grease trap describes that it can removes all the fat and grease from water. It also operates efficiently and effectively without need to use mechanical components. Disadvantages of this product are not easy to clean and easily to melt if in hot temperature.

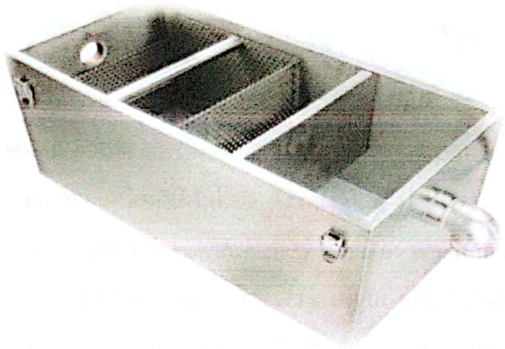


Figure 2.3: Grease Trap Waste Filter Interceptor

Based on the description this grease trap work on the basic principle of that FOG's (Fat, Oil & Grease) float on water and solid particles sink. Oil and grease trap is made of stainless steel which is corrosion resistant. We have portable oil trap in our stock. Easy to clean, the oil and grease trap can be placed inside kitchen beneath the sink unit. Our oil and grease trap is quite easy to operate and move. Automatic units are on order in our factory which is based in Delhi, India.

Specifications:

- Brand: Lyra
- Place of origin: Delhi India
- Size/ capacity: 10 litres to 255 litres
- Price: 300 rupees equal to RM20.12
- Supply ability: 100 units per month
- Power: electric
- Load: 0.5 kw
- Warranty: 1 year
- Certificate: ISO 9001-2008
- Packing: Bubble wrap/ wooden crate/ cartoon box
- Port: Gujarat

2.4 Summary

This all to set solve some of the problems arising from the use of an existing filter, almost every day PoliteknikMukah Sarawak's (PMU) citizens had to sniff unpleasant smell. Likewise, for the canteen they need to wash the existing filter once a week and the cafe also need to wash it every night after trade. Materials for the project should also have special features which do not pursue rusty and based on literature review conducted using stainless steel is the most appropriate for the project.

CHAPTER 3

METHODOLOGY

3.1 Introduction

The procedure in this chapter and all manner ever available nowadays, and after building a model will be discussed and explain in more detail. There are three methods of manufacturing in this chapter of design methods, project design and design methods.

This chapter also the applicable from the beginning of the design of the production of ideas and concepts. Design methods will be explain in more details the steps of the project design, while the street testing methods discuss ho to be listed on the product model developed

3.2 Design

3.2.1 GT (Green Tech) Oil Filter

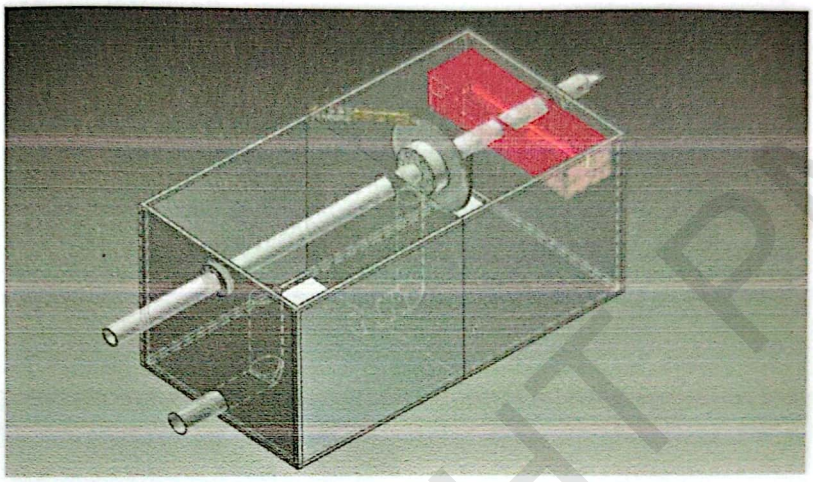


Figure 3.1 3D View

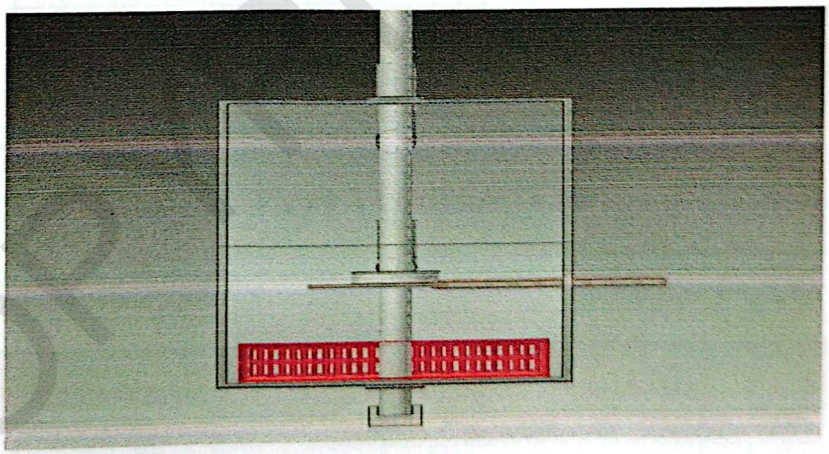


Figure 3.2 Upper View

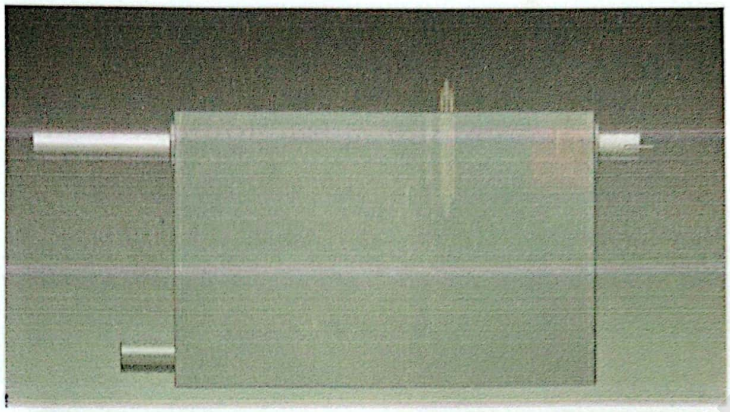


Figure 3.3 Right side view

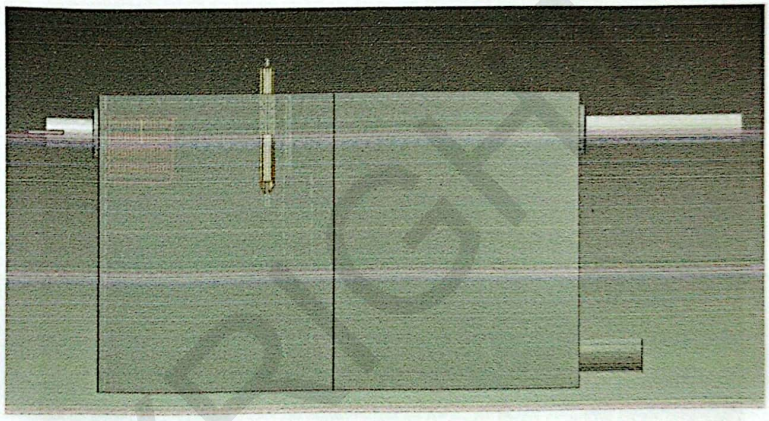


Figure 3.4 Left side view

Figure 3.5 Front view

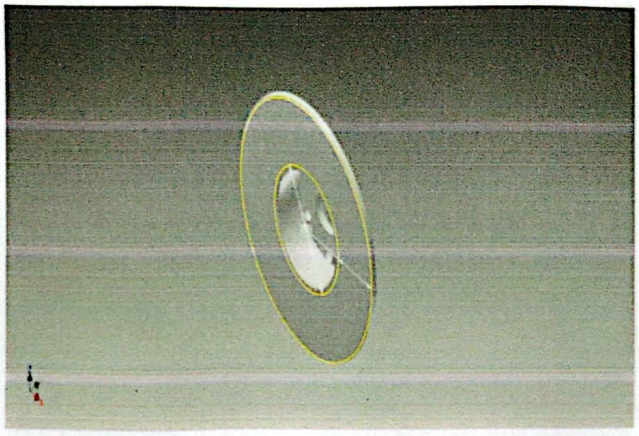


Figure 3.6 Dimension disc

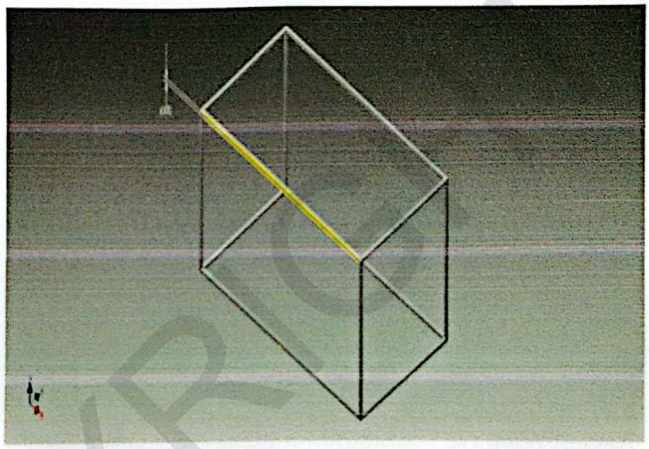


Figure 3.7 Hollow dimension

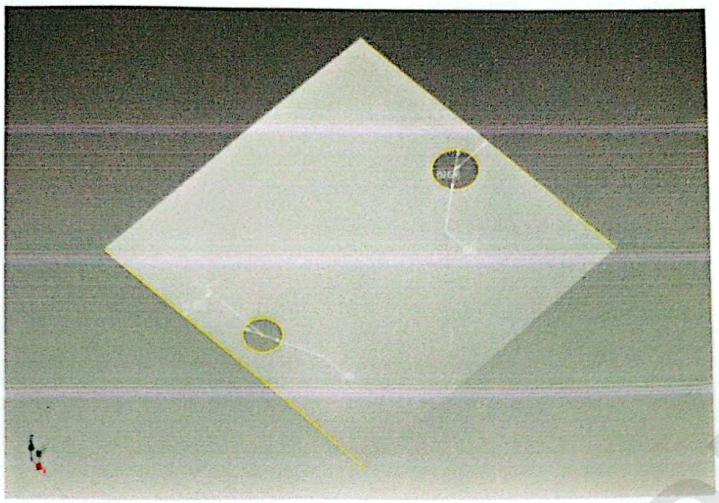


Figure 3.8 'L' pipe and bearing holes dimension

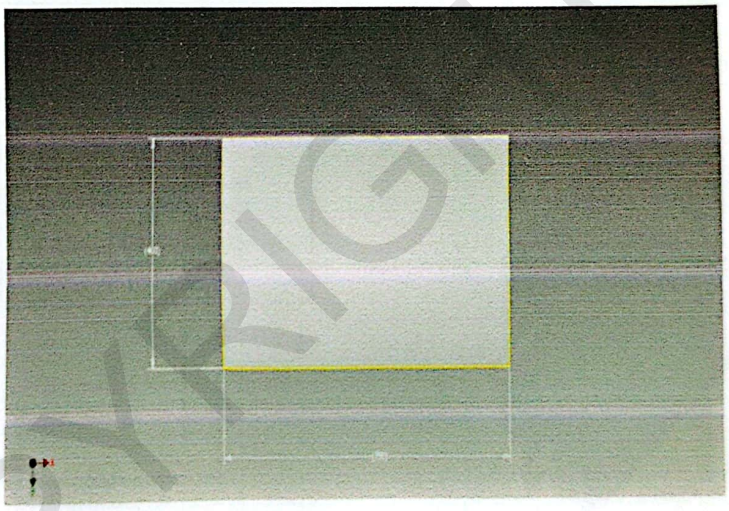


Figure 3.9 Plate dimension

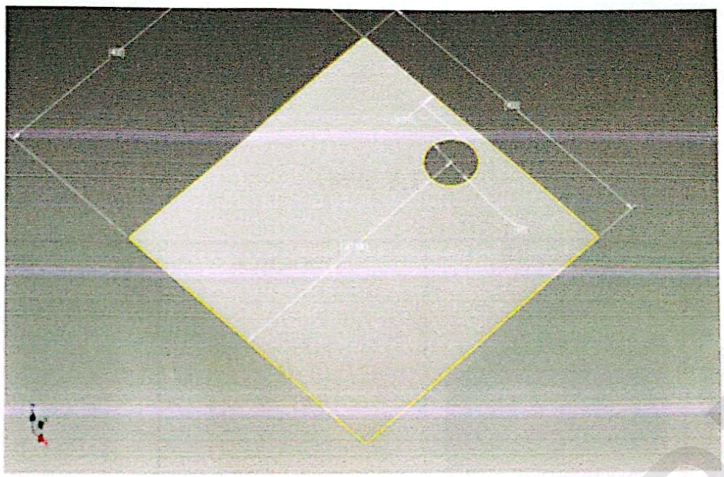


Figure 3.10 Divider dimension

3.2.2 Isometric View

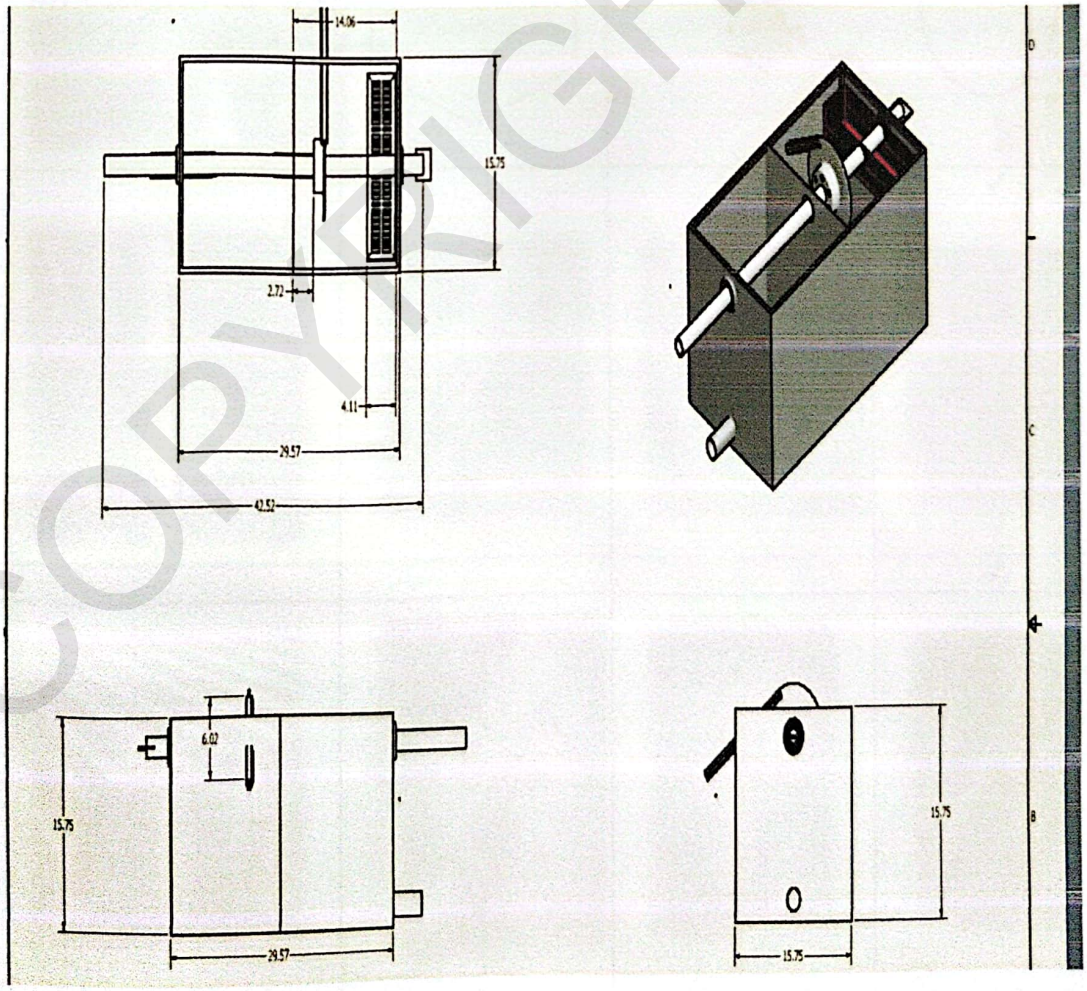
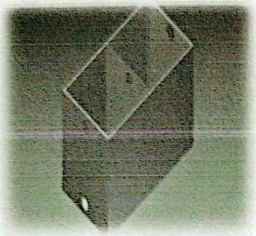
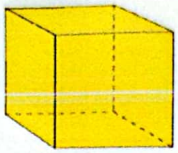
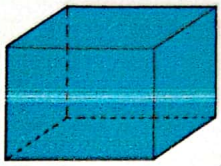
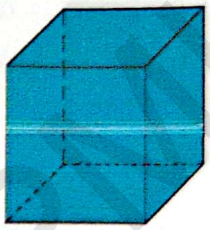


Figure 3.11 Isometric view

3.2.3 Concept Generation

Table 3.1

Method	Option 1	Option 2	Option 3
			
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	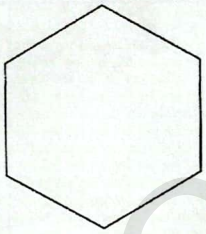	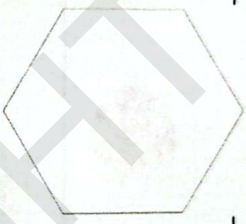	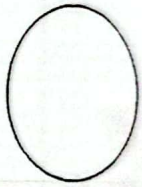
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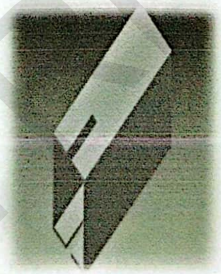
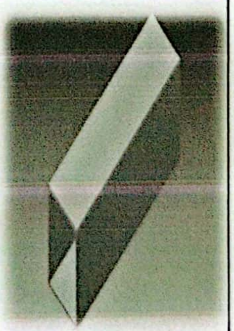
			
			✓
			
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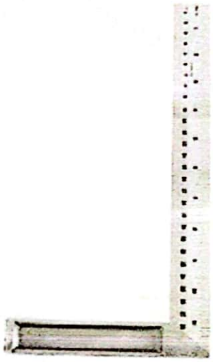
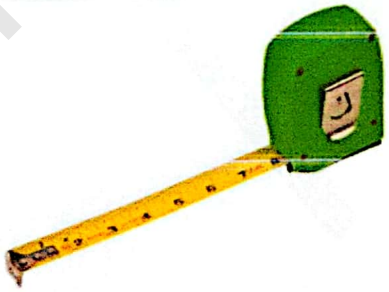
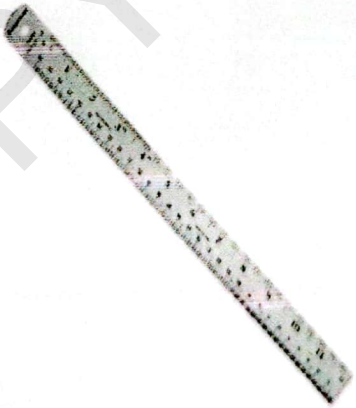
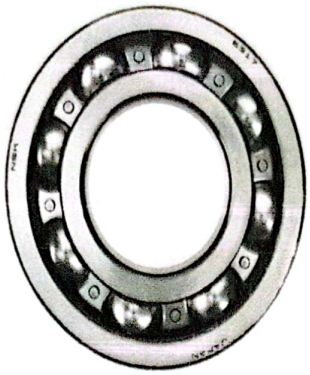
3.3 Instruments

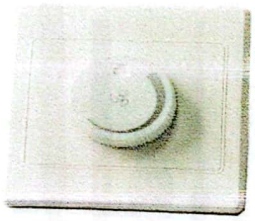
Table 3.2

	L Square 90 Degree Ruler
	Chalk marking and Permanent marker pen
	Measuring Tape

	Hammer
	TIG welding machine
	Steel Ruler

	Bearing
	Shaft
	Sponge attach at

	slide binder
	Nylon cable ties
	Food grease for solid waste

	Silicon Gun
	Fan Dimmer
	DC motor o.37kW

	Hand Grinder
	Fitting

3.5 Project Planning

Table 3.3: Gantt Chart

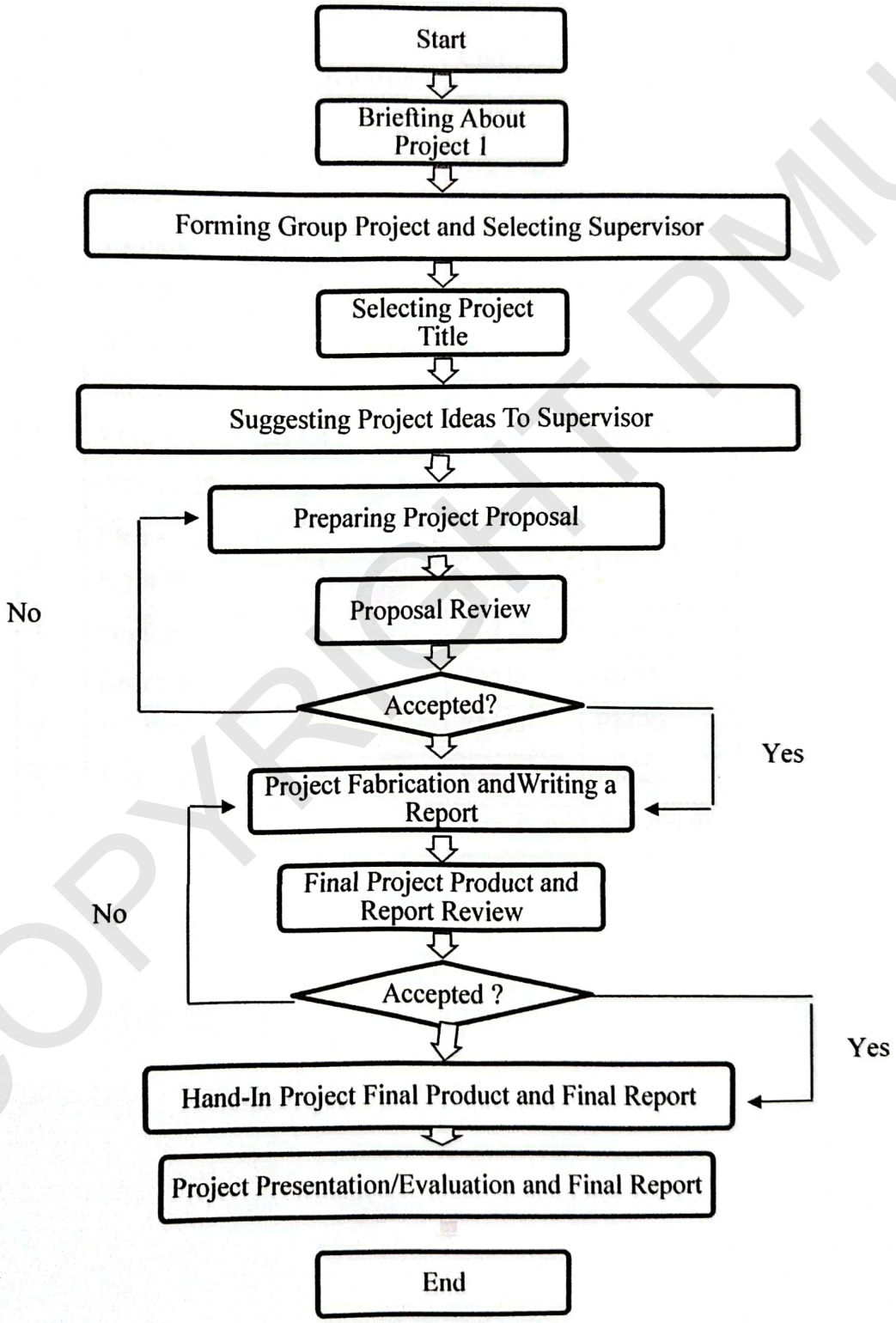
WEEKLY ACTIVITY	Status	W1	W2	W3	W4	W5	W6	W7	W8	W9	W10	W11	W12	W13	W14	W15	W16
Registration Week	P																
	A																
Project 2 Briefing	P																
	A																
Project Fabrication	P																
	A																
Purchasing Items	P																
	A																
Fabrication Progress till 50%	P																
	A																
50% Fabrication Presentation	P																
	A																
Project Perfectly Assemble	P																
	A																
Project Testing (Data Collection)	P																
	A																
Data Analysis	P																
	A																
Summary	P																
	A																
Project 2 Presentation	P																
	A																

Note

P: Plan

A: Actual

3.5.2 Flow Chart



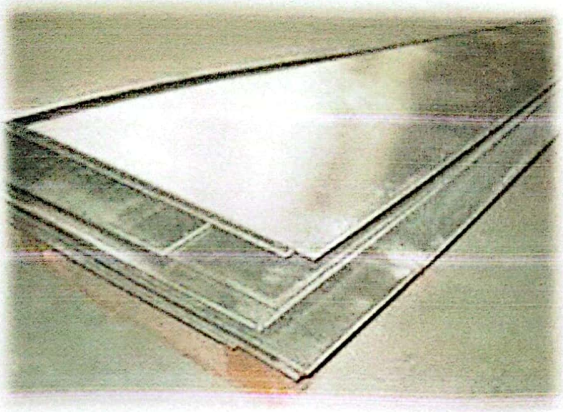
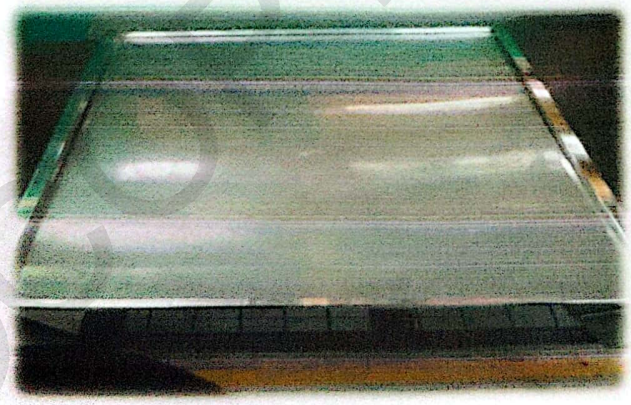
3.6 Cost

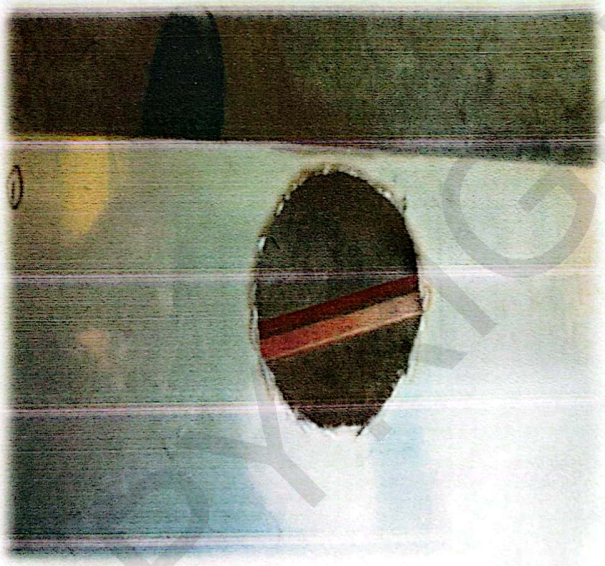
Table 3.4: Cost

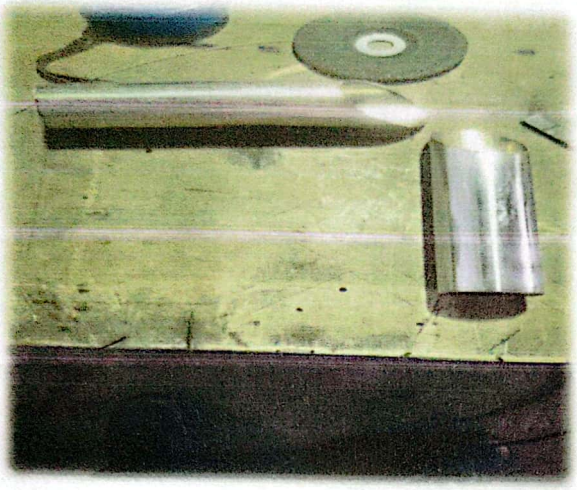
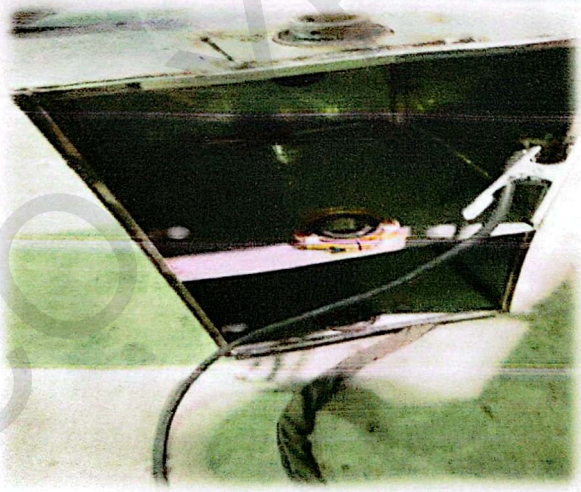
No.	Component	Quantity	Unit Price	Total
1	Hitachi Cutting disc 4"x3	1	RM3.30	RM 6.60
2	Stainless steel 16"x20" 2Bx1.0mm	1	RM30	RM30
3	Stainless steel 1.0mm 2B 4/2"X4/2"	4	RM30	RM275
4	Motor DC 0.37kW	1	RM180	RM180
5	Hollow	4	RM 30	RM115
6	Bearing	2	RM35	RM70
7	'L' Pipe	2	RM45	RM90
8	Dimmer	1	RM20	RM20
			Sum Total	**RM786.60**

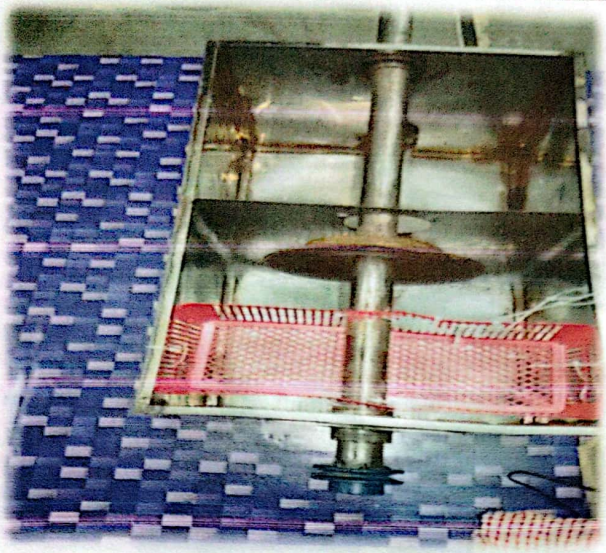
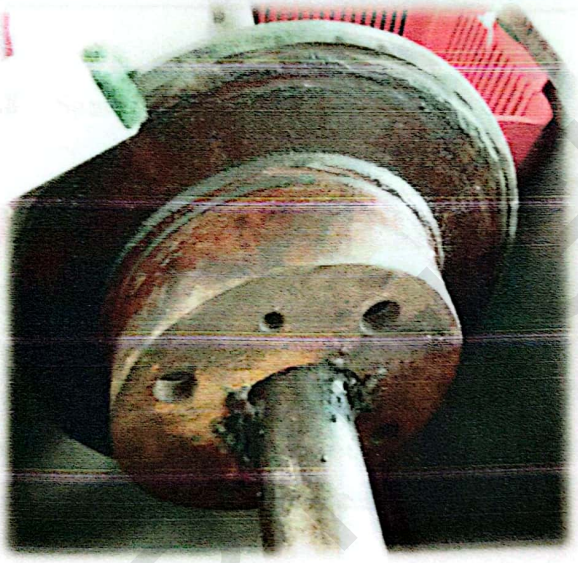
3.7 Fabrication Process

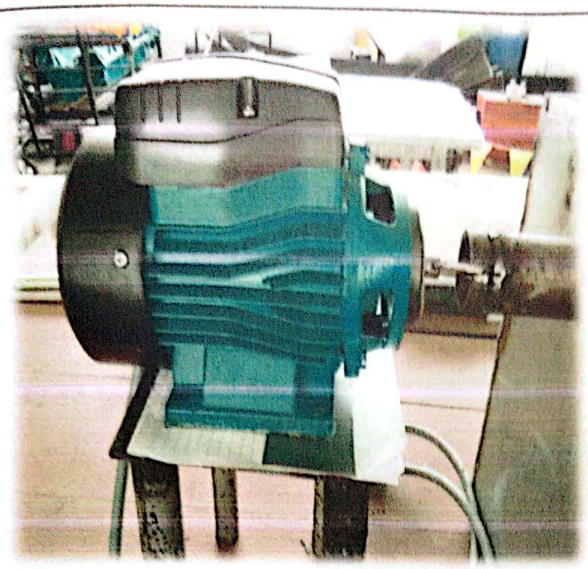
Table 3.5

	**Step 1 :** We measuring the material according to the dimension that we had decided. The dimension of stainless steel is measured and marked. Then it is cut using a shear cutting machine with the dimension we decided.
	**Step 2 :** Cutting the hollow using a hand grinder and attached the hollow together with tungsten inert gas (TIG) welding.
	**Step 3 :** All of the stainless steel that have cut are welded together according to the frame design.

	**Step 4 :** Mark the circle on the stainless steel plate to make a hole for the bearing.
	**Step 5 :** Another holes was specified for 'L' pipe.

	**Step 6 :** Cutting the circle hollow using the hand grinder.
	**Step 7:** The 'L' pipe inserted to the hole and weld surrounded the pipe using tungsten inert gas (TIG).
	**Step 8 :** Attached the divider part at the center of the body.

	**Step 9 :** After both parts divider attached using the silicon gun, we inserted the shaft through the holes that have been made. Meanwhile the disc was hold to allow the shaft go through it.
	**Step 10 :** Insert the shaft into the disc and attached.

	**Step 11 :** Finally, motor assembly.

3.8 Summary

Conclusion of his chapter describes the study design methods, project design and method used in the test run implement model project. Before running the model project to be developed some of methods used to develop a model project to verify and ensure the instruments used easily. The methods used to obtain an initial overview of the background of the respondents among which are sketching preliminary drawing using Autodesk Inventor, engineering design, methods of data analysis used this projects to answer the question of project.

CHAPTER 4

FINDINGS

4.1 Introduction

The process of evaluating data using analytical and logical reasoning to examine each component of the data provided. This form of analysis is just one of the many steps that must be completed when conducting a research experiment. Data from various sources is gathered, reviewed, and then analyzed to form some sort of finding or conclusion. There are a variety of specific data analysis method, some of which include data mining, text analytics, business intelligence, and data visualizations.

4.2 Purpose Of Analysis

Analysis is carried out to test the efficiency and capability of the product. Data and test are carried out to determine the limitation and the maximum capacity that the product can withstand. The recorded result helps to sets the product safety factor and leave room for improvement in the future

4.3 Data And Analysis

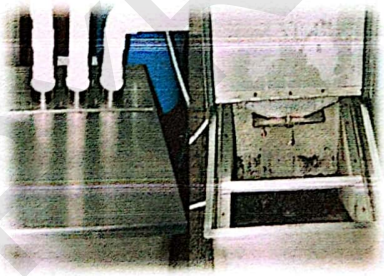
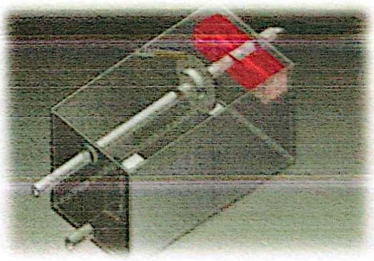
Test run is carried out by placing our product at cafe and canteen sink then switch the product on so that it will be begin to filter the wasted water.

Table 4.1 Product data analysis

Locations / Volume of oil per minutes (ml)	Cafe	Canteen	Average
5minutes	250 ml	230 ml	240 ml
15 minutes	750 ml	800 ml	775 ml
30 minutes	1500 ml	2000 ml	1750 ml

4.4 Product Comparison

Table 4.2 Comparison

 Product In Market	 GT Oil Filter
The product in market does not filter a lot of oil	Our product is able to filter the greases
Cannot filter the solid waste.	Able to filter small solid waste
There's 20 ml/minute efficiency recorded as it does not filter any wastage	Efficiency our product ml per minute equivalent to 50 ml/minute

4.5 Method Of Analysis Data

i. Run the GT OIL FILTER.
ii. Collect the oil from the grease that flow at the pipe in half an hour.
iii. Compare the existing grease trap with the GT OIL FILTER.
iv. The disc on GT OIL FILTER focused the oil and water and less flow out the grease to the drain compare to the existing to the existing grease trap at PMU café and canteen.

4.6 Safety Factor

Maintain the speed of the motor to avoid the waste water from splash out from the product. Control the temperature of the motor to avoid it from over heat by placing the motor into the room with control temperature that is not exceed 37° Celsius.

4.7 Conclusion

Data analyses are done by running a test run on the product. The data obtained are recorded in order to be analyzed later on. The result effect the objectives of the project and this data could as a proofed the product has achieved its objectives.

CHAPTER 5

DISCUSSION, CONCLUSION AND RECOMMENDATION

5.1 Introduction

This chapter describes the finding of the project by linking through the achievement of project objectives. This chapter also explain the findings of the project and present the results of an analysis of the project. This includes our literature review in Chapter 2. The purpose of this discussion was to reinforce the reasons why this project is to reduce the oil flow and cause pollution to the environment. We also discussed are the past and the problems that have to find a solution is part of the analysis and findings of the project.

5.1 Discussion

Throughout the production process of this project, some problems have arisen in our group. Such as the welding process for welding thin material and easy to leak. Besides we also have installation problems bearing on stainless steel plate as bearing made of steel and it cannot be welded on stainless steel plate. Thus, the time and less experience in the production of this project, our group has taken a relatively long time in the process of welding. We also have problems motto speed.

Therefore we have to look for other initiatives where we asked our supervisor and ask for help from friends who are more knowledgeable about the project. After the applying dimmer on motto which is to reduce the speed, so our project move perfectly and showed a reduction in speed is necessary.

5.2 Conclusion

In conclusion, the process of making the oil filter is successfully even through several stages or processes before it showed good results and can be used properly by the uses. Throughout this project, we can learn how to use the machines that existing in our workshops, can improve welding skills and also learn how to wire connection. In addition, we can add more in depth knowledge in a field of study whether through mass media or print and electronic media.

5.4 Recommendation

To improve the quality of implementation of this project, a number of proposals put forward in this subtopic. Which is providing equipment such as drilling, cutting, and grinder and the work of student projects run smoothly according to a predetermined time. Besides, also proposed a workshop session for student work and classroom time should be according to each project to facilitate each group can borrow or use the facilities in the workshop.

To improve the quality of our project, we recommend the use of mini fan in our project is necessary to facilitate the movement of bikes without stopping after overheating. In fact, we suggested that the motto we used to rotate the shaft should be positioned flat to facilitate its work.

5.5 Summary

This chapter describes the finding of the project by linking through the achievement of project objectives. This also explain the findings of the project and present the results of an analysis of the project. This includes our literature review in Chapter 2. The purpose of this discussion was to reinforce the reasons why this project is to reduce the oil flow and cause pollution to the environment. We also discussed are the past and the problems that have to find

a solution is part of the analysis and findings of the project. Other that, we have recommended some ideas to improve the quality of our product.

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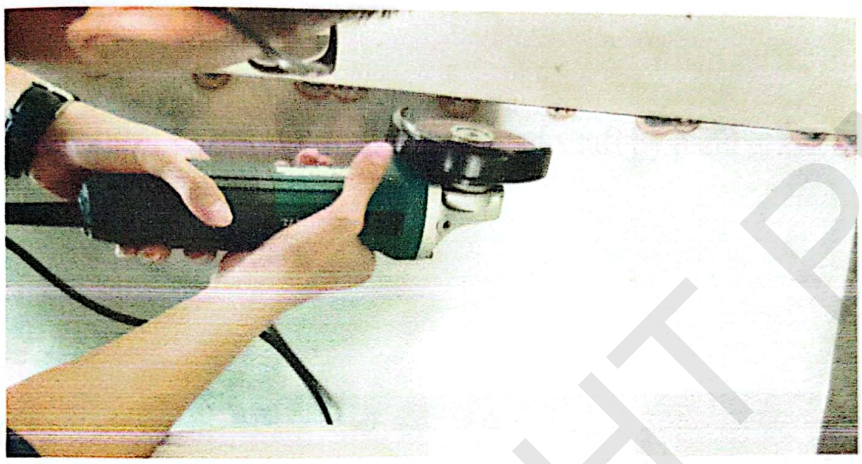
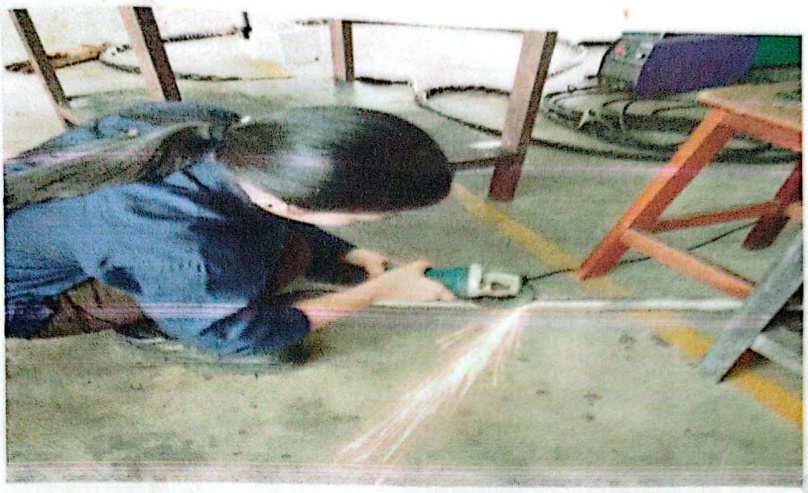
APPENDIXES



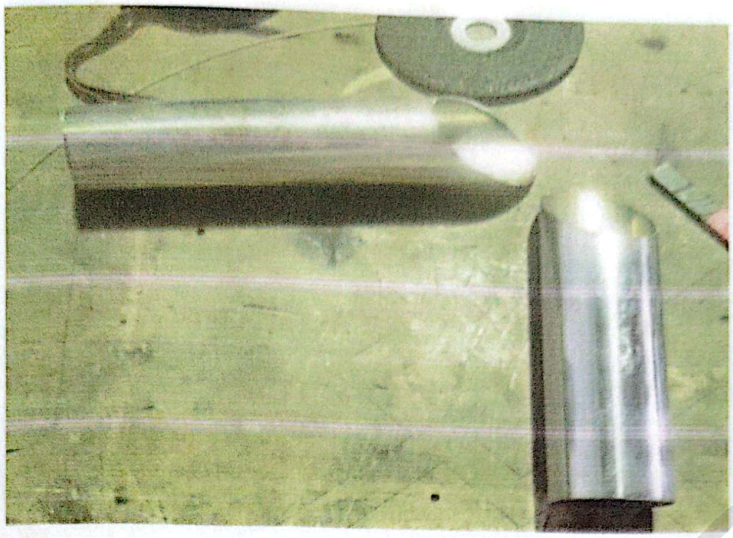
AppendixA:Cutting the plate of stainless steel

Appendix B: Bearing the fitting process

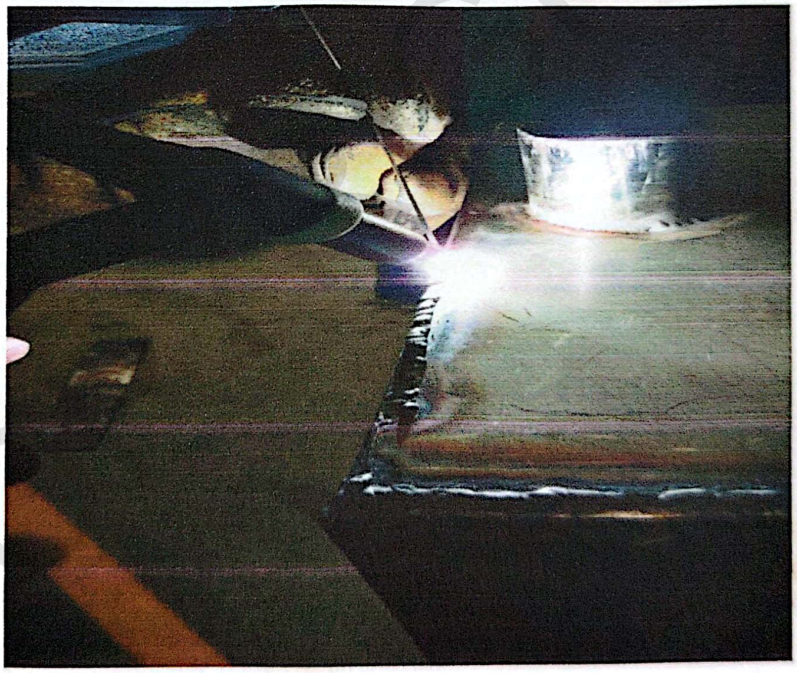


Appendix C:Reduce the thickness of shaft by hand grinder

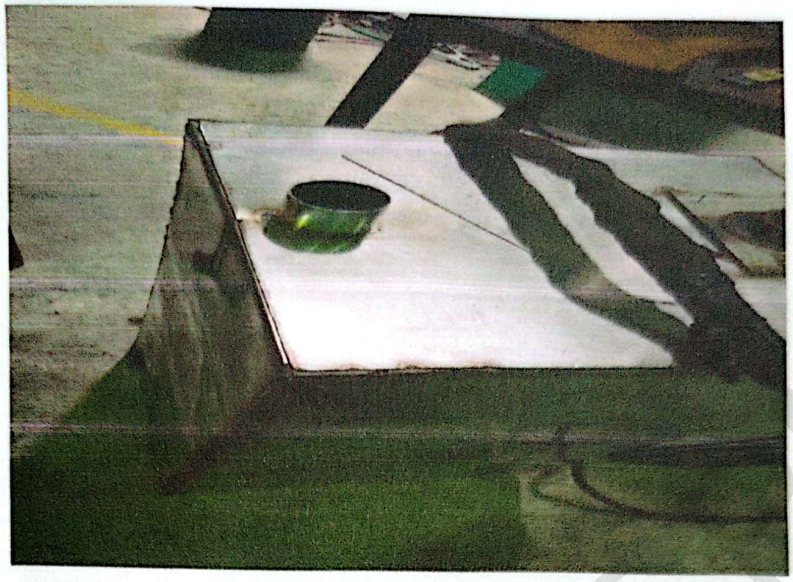
Appendix D: In order to weld the plate



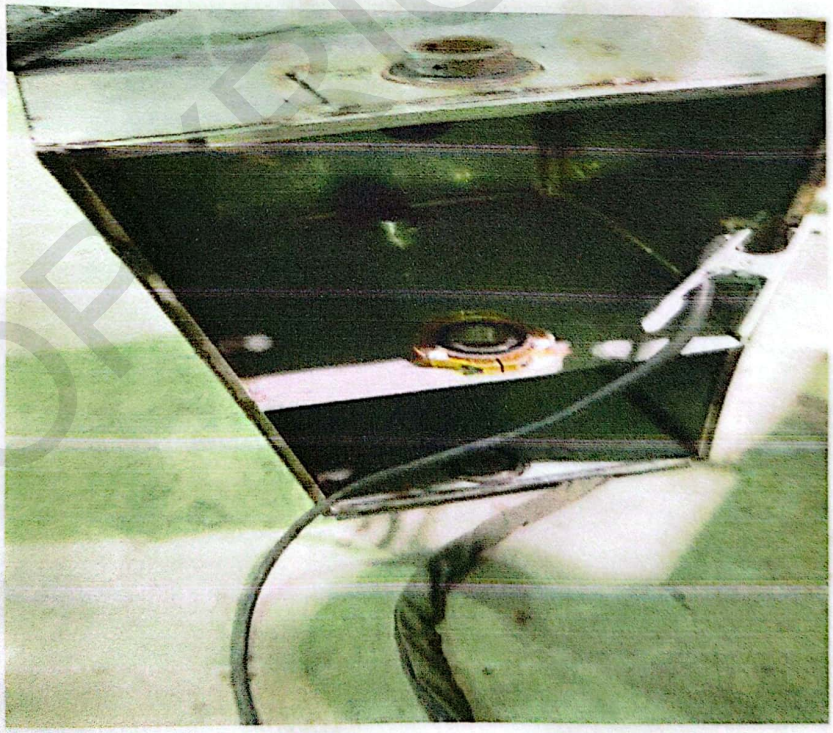
Appendix E: Cutting 'L' pipe stainless steel



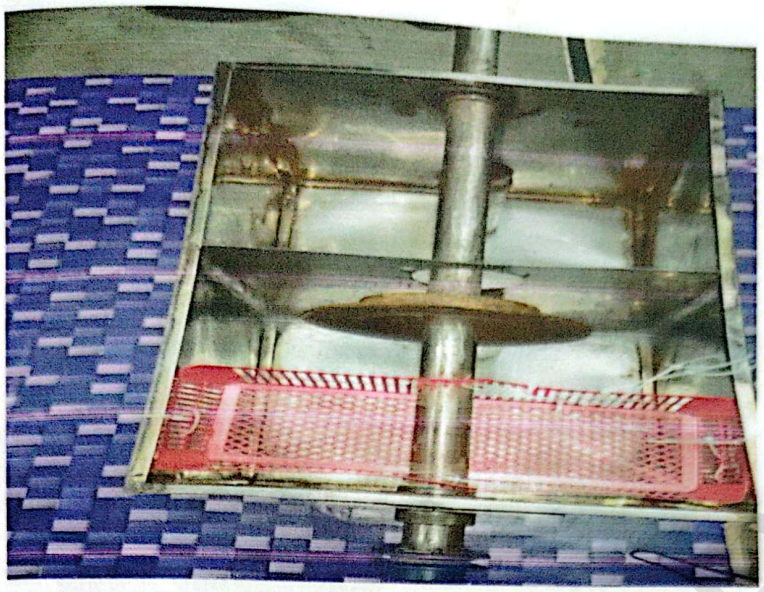
Appendix F: Tag a threaded portion



Appendix G: Threaded 'L' pipe on plate

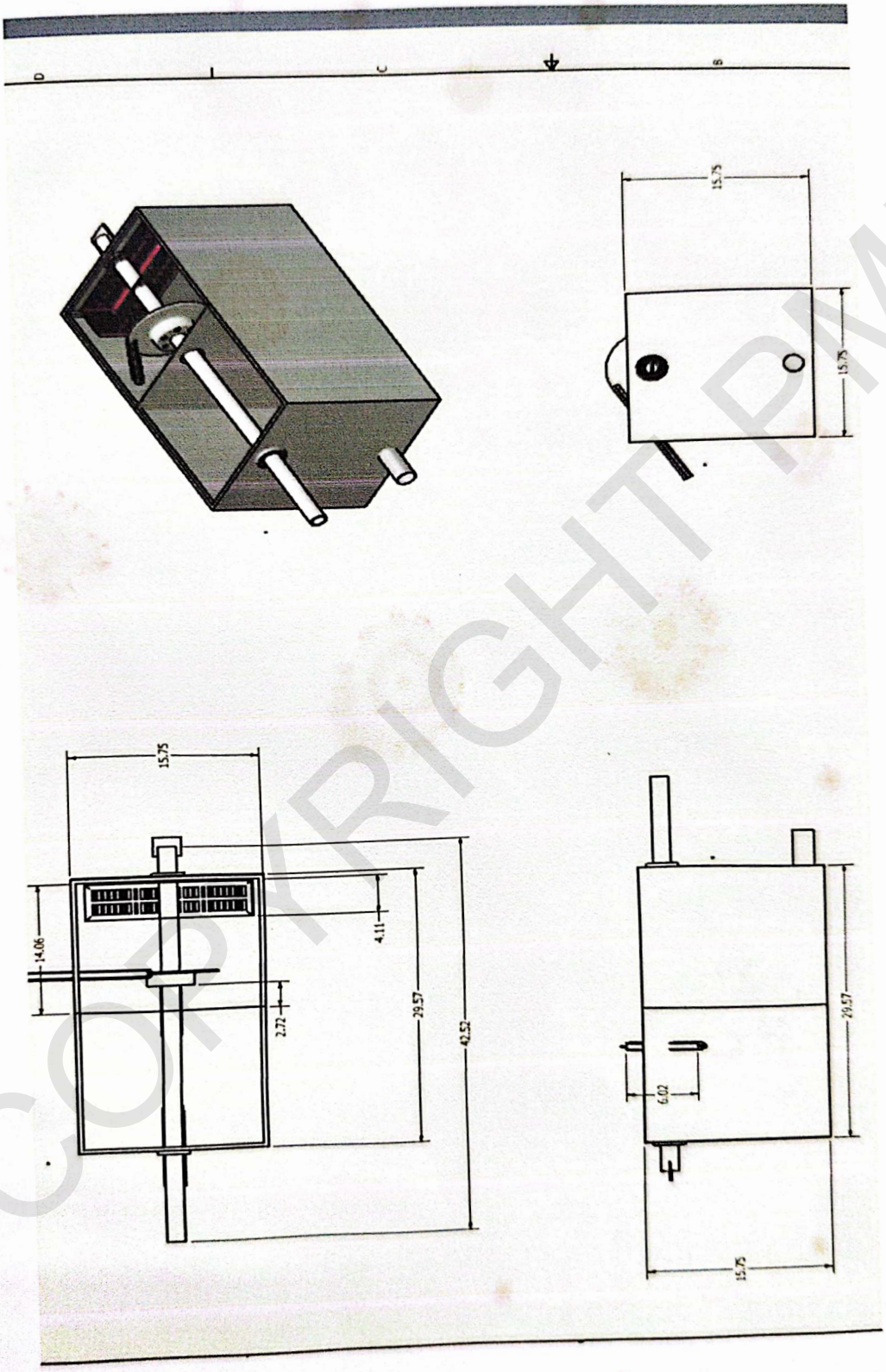


Appendix H: Welding the divider plate



Appendix I: Shaft and brake disc assembly

Appendix J: Disc



AppendixK: Dimension isometric view