

POLITEKNIK SULTAN SALAHUDDIN ABDUL AZIZ SHAH

ADVANCE VACUUM

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JABATAN KEJURUTERAAN MEKANIKAL

JUN 2020

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**Laporan ini dikemukakan kepada Jabatan Kejuruteraan Mekanikal
sebagai memenuhi sebahagian syarat penganugerahan Diploma
Kejuruteraan Mekanikal**

JABATAN KEJURUTERAAN MEKANIKAL

JUN 2020

AKUAN KEASLIAN DAN HAK MILIK

TAJUK : ADVANCE VACUUM

SESI : JUNE 2020

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Adalah pelajar tahun akhir **Diploma Kejuruteraan Mekanikal, Jabatan Kejuruteraan Mekanikal, Politeknik Sultan Salahuddin Abdul Aziz Shah**, yang beralamat di **Persiaran Usahawan, 40150, Shah Alam, Selangor**. (selepas ini dirujuk sebagai 'Politeknik tersebut').

2. Kami mengakui bahawa "Projek tersebut di atas" dan harta intelek yang ada di dalamnya adalah hasil karya/reka cipta asli kami tanpa mengambil atau meniru mana-mana harga intelek daripada pihak-pihak lain.

3. Kami bersetuju melepaskan pemilikan harta intelek 'projek tersebut' kepada 'Politeknik tersebut' bagi memenuhi keperluan untuk peanugerahan **Diploma Kejuruteraan Mekanikal** kepada kami.

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First of all , I would like to thank Allah SWT , a place where we pray and surrender , who has given us strength and ability to complete this project on time.

Next , I would like to express our deepest appreciation to all those who provided us the possibility to complete this report . A special gratitude I give to our final year project supervisor Mr Zulkarnain , who had guided us a lot for during this whole semester and gave us the permission to use all the equipment and the necessary materials to complete our project .

Last but not least , not forgetting to express our deepest gratitude and appreciation to all of our friends and all the people have helped , support and contributed to complete this project without helps from them , we would face many difficulties while doing this project .

ABSTRACT

Advance vacuum is an alternative to move debris and suck in such as leaves , grass cuttings and small litter via vacuum and move them into a bag. Nowadays , when people use air blower they need to do two job while cleaning which need to collect the garbage then need to throw it away . It's kind of hard if the garbage or dust was flown by wind, they need to clean it up again using air blower. To facilitate the work of gardeners and environmental cleaning workers , our group has discussed to innovate the blower machine to become a vacuum without changing the circuit. Therefore,we want to redesign a nozzle of air blower to make it two ways which we want to produce a blower that can be used in duo function which can be blower or vacuum. Blower will be tested based on air speed and pressure and it is expected that this blower will produce a pneumatic vacuum that can inhale leaves and small litter. This advance vacuum is suitable and works well for outdoor use since we do more focus to outdoor that can clean leaves, dry leaves and small litter. In future, we want this project to be used comprehensively, especially for gardeners and environmental cleaning workers with an ergonomic design recommended.

ABSTRAK

Vakum terlebih dahulu adalah alternatif untuk memindahkan serpihan dan menyedut seperti daun, keratan rumput dan sampah kecil melalui vakum dan memindahkannya ke dalam beg. Pada masa kini, apabila orang menggunakan tampan udara mereka perlu melakukan dua pekerjaan sementara pembersihan yang perlu mengutip sampah kemudian perlu membuangnya . Agak sukar jika sampah atau habuk diterbangkan angin, mereka perlu membersihkannya semula menggunakan blower udara. Untuk memudahkan kerja tukang kebun dan pekerja pembersihan alam sekitar, kumpulan kami telah berbincang untuk menginovasi mesin blower untuk menjadi vakum tanpa menukar litar. Oleh itu, kami ingin mereka bentuk semula muncung tampan udara untuk menjadikannya dua cara yang kita mahu menghasilkan blower yang boleh digunakan dalam fungsi duo yang boleh menjadi blower atau vakum. Blower akan diuji berdasarkan kelajuan udara dan tekanan dan dijangkakan bahawa blower ini akan menghasilkan vakum pneumatik yang boleh menyedut daun dan sampah kecil. Vakum pendahuluan ini sesuai dan berfungsi dengan baik untuk kegunaan luar kerana kita lebih fokus kepada luar yang boleh membersihkan daun, daun kering dan sampah kecil. Pada masa akan datang, kami mahu projek ini digunakan secara komprehensif, terutamanya untuk tukang kebun dan pekerja pembersihan alam sekitar dengan reka bentuk ergonomik yang disyorkan.

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CHAPTER 1

INTRODUCTION

1.1 RESEARCH BACKGROUND

We all have seen many company use blower machine to clean up their ground. We also admit it, it's the easy way to clean floor or ground. They use that machine and then they pick up trash and put in the garbage. What they doing they will repeat until the floor is clean. We noticed that work maybe can make it more easy if we do some inovation at blower machine. What we want to do is make the blower machine can become a vacuum. This is not possible after we make some research about it.

We choose to use pneumatic vacuum as a theory. Blower machine can make a pressure, if something have a pressure its also have a vacuum. Then we redesign the nozzle of blower machine to become a vacuum. We chose to redesign the nozzle because people can use two in one(blower or vacuum). Its can become more easy and more usefull for people.

That's why we call it Advance Vacuum. People just need to install Advance Vacuum at the top nozzle at it can use as a vacumm, if people need to use blower just plug it off. But the pointed at vacuum because that's the reason we make it.

1.2 PROBLEM STATEMENT

After we see some people use the air blower machine nowadays, that who use it while cleaning they need to collect the garbage then they need to throw it. This kind of situation they need to do two job while cleaning. Its kind of hard if the garbage or dust was flown by wind, they need to clean it up again using air blower. Some worker just blow the garbage without collect it then burn it or throw it away. This is make the garbage like dry leaver increased and probability the dry leaver can burning is high. That's why the project we do is can help them to work easily and more enjoyable while using it.

1.3 RESEARCH OBJECTIVES

The objectives to this research are:

1. To design the nozzle of air blower machine become a vacuum.
2. To produce pneumatic vacuum that can use in duo function.
3. To produce the blower machine easy to use while cleaning.
4. To develop pneumatic system and concept into our project.

1.4 RESEARCH QUESTIONS

This study will answer the following research questions:

- i. What size garbage can vacuum?
- ii. Is it hard to use it?

1.5 SCOPE OF RESEARCH

The scopes and limits to this research are:

1. Only 80mm size garbage and below can vacuum.
2. Cannot vacuum wet garbage.
3. Cannot vacuum heavy weight only light weight

1.6 CHAPTER'S SUMMARY

In this chapter, the studies was explained about its origin of ideas and inspirations. All the objectives were made out of all the problem statements. The objective for this project is to make the machine can do in duo type for example vacuum and blower. This new Advance Vacuum can use at other compony and basically for all people.

CHAPTER 2

LITERATURE REVIEW

2.1 INTRODUCTION

This chapter will provide the review from previous research that is related to this final year project. A literature review is a survey of scholarly sources on a specific topic. It provides an overview of current knowledge, allowing you to identify relevant theories, methods, and gaps in the existing research. For this final year project, we have run the research by visiting hardware store to see a various type of blower vacuum that have in market, also we did a survey from the hardware about the oldest and the latest blower vacuum that have in market right now. Other than that, we also ask the blower consumer which were environmental worker and gardener about their feedback when used the blower. Besides that, we did a research on blower for these past 10 years. As we headed to the fast-paced world of technology as well as advanced technology. We has examined theres an advantages and disadvantages on every revolution of blower.

2.2 THE DEVELOPMENT OF BLOWER MACHINE

Prepared By

2010-2012

has examined the monoculture of non-native grasses in the urban environment, its effect on native organisms and how it has disrupted entire ecosystems. In addition to the exceptional squandering of natural resources for a harvest that is discarded, which is unsustainable and a burden to infrastructure, it is simultaneously creating respiratory health hazards. Blower generates a current of air used to collect loose leaves and debris which are powered by electric or gasoline motors. The fan in a leaf blower is powered, by gas or by electricity. Leaf blower uses either gas or electricity to power the fan, which in turn produces the flow of air that blows your leaves. Gas-powered models tend to produce more power more suited for heavy-duty jobs. However, heavier and were brutally noisy gadgets and also cause more pollution due to the emissions they produce. They come as either handheld model or as ([backpack leaf blower](#)) which are almost common choice that for that time due to commercial grade leaf blowing operations for suitable larger area house land. In addition, backpack blowers typically cost more than handheld blowers, but they offer more power and transfer weight from your arms to your back and shoulders. Backpacks tip the scales at 22 pounds.



2013-2015

This is an example of a blower that is called a “Corded Electric Leaf Blower” for blowing leaves and dust. As you can see, there is a wire for this type of blower, which is why it is called a “corded electric” because it needs electric energy to use it. This type of blower was designed to be more lightweight and easy to carry, which just needs to be used one-handed to carry a blower. This kind of vacuum is targeted for a consumer who needs a reliable leaf blower and doesn't want to bother with gas or recharging a battery. Other than that, it has variable speed control for better control. It is well-balanced, easy to use, which you just need to plug it in and switch the button on/off, and it is quiet. This kind of model vacuum has an oscillating nozzle, which is powerful and can move large quantities of leaves easily. The advantages are that it is more lightweight than a backpack and suitable for home use, but the disadvantages are that it needs a plug to switch to turn it on.



2016-2018

Next is a “Cordless Electric Leaf Blower” leaf blower, generally more lightweight and maneuverable, these units are gaining popularity for people who shun the maintenance requirements of a gas-powered model and don't want to be tethered to a power cord. Know that by going free-range, a consumer will sacrifice some power. Rechargeable batteries run for about an hour tops, so if the chore takes longer, you will have to take a break while the battery juices up or have a second battery on hand. Cordless-electric versions offer less power than gas models and limited runtime per battery charge. But these units are light, typically weighing in at less than 10 pounds.

2.3 METHODS OF MAKING ADVANCE VACUUM

Prepared by Sharifah Nurul Balqis

To make advance vacuum is not too hard. We are only using basic item to make the nozzle. What we using is only PVC pipe , glue PVC, and plastic bag. And then we follow our design to make it

2.3.1.2 Advantages of Advance Vacuum

- Easy to use
- Can use in duo function
- cheap

2.3.1.2 The Disadvantages of Advance vacuum

- cannot vacuum heavy weight
- cannot vacuum wet garbage
- cannot use at machine has low power pressure

2.4 MATERIAL SELECTION

1. PVC pipe
2. Glue
3. Gunny bag

2.5 CHAPTER'S SUMMARY

As to conclude this chapter, literature review is important to showcase all the studies of materials and methods to enhance the knowledge on this project. Every thesis and others projects that are related to this bio-friendly polymer composite prosthetic leg is really helpful especially for us to understand it fully.

After a lot of materials and methods were discussed and researches were done, the materials that are the most compatible for our project is thermoset. Due to its characters and advantages, meanwhile the methods that we decided to carry on is hands layup method. This is because of its low cost benefits and great for beginner's process.

CHAPTER 3

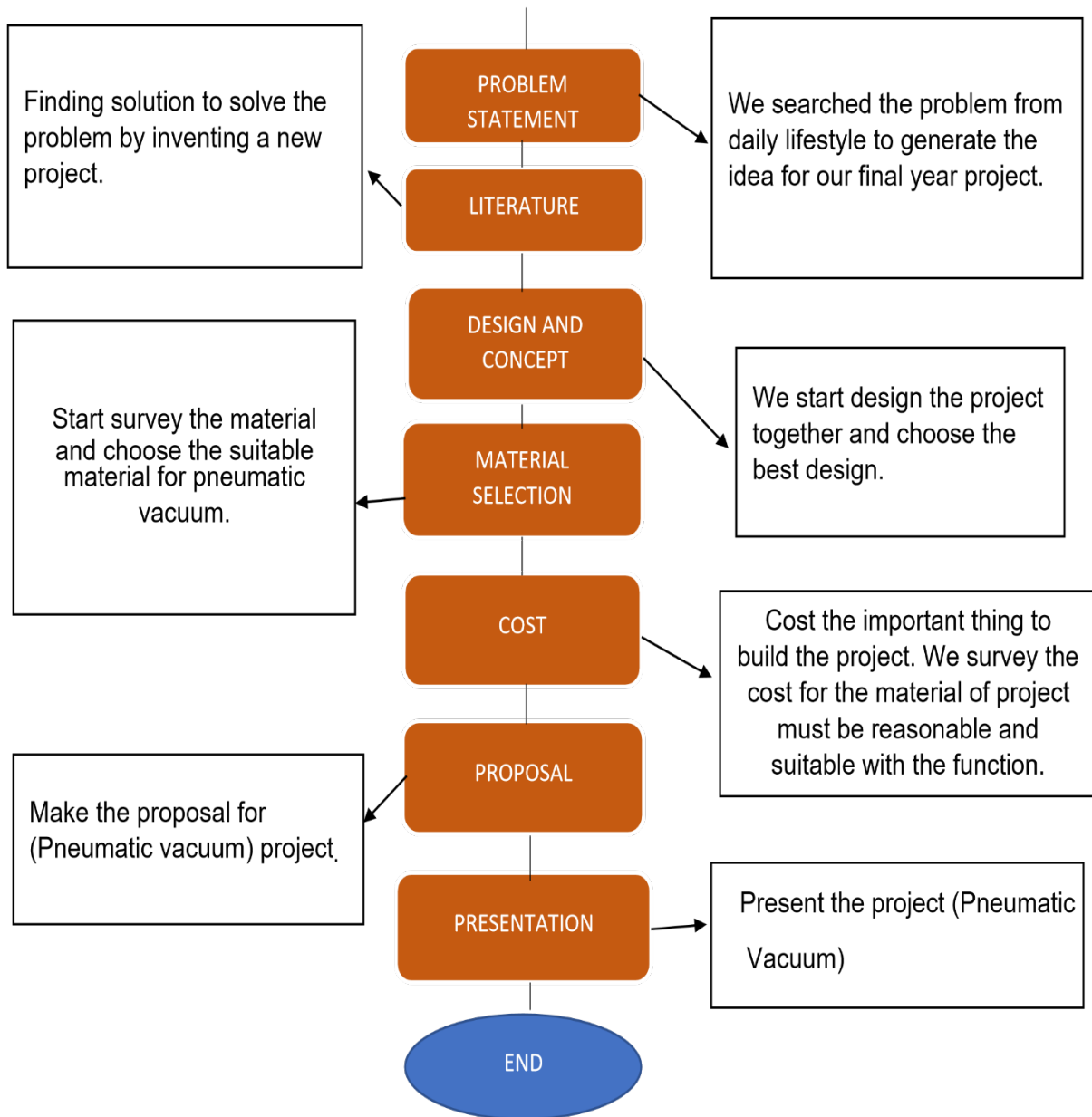
METHODOLOGY

3.1 INTRODUCTION

What is methodology? Methodology is the systematic, theoretical analysis of the methods applied to a field of study. It comprises the theoretical analysis of the body of methods and principle associated with a branch of knowledge. Typically, it encompasses concepts such as paradigm theoretical model, phases and quantities or qualitative techniques. These steps are very important in implement this project to ensure that this project is succesfully completed on time. In producing a project, there are several steps that need to be taken before the project is completed. These steps need to be done carefully in order to produce a quality and quality project. Advance Vacuum is designed based on a planned methodology. There are several steps that have been taken to produce this project. The next description will explain the methodological steps. In general, this "Advance Vacuum" project involves the process of working in workshops such as cutting, marking, grinding, connecting and so on. This process is one of the processes that plays an important role. Without this process, most likely this project will be difficult to complete. Here will also be explained the implementation of this project can be carried out from the initial stage to the information process

3.2 FLOW CHART

ccc



3.3 FLOW CHART EXPLANATION

Prepared by Sharifah Nurul Balqis Bt Syed Abdul Mutalib

- **Material Selection**

1. PVC pipe



We used PVC pipe because it's a light weight and cheap. Its used to be a new nozzle.

2. Glue PVC



The glue is used to make PVC can stick two or more things together.

3. Gunny bag



Gunny bag is for the trash will collected while using the machine (advance vacuum).

4. Air blower machine



Air blower machine is the main machine that we use to make the advance vacuum funtionable. This machine can make air pressure that we need.

- **Method Selection**

This method selection process is important so that the method choose is accurate and suitable for the product. This method selection will avoid money lost. Hence, it is important to carry out this method selection process. There is methods that could be carried out:

PNEUMATIC VACUUM SYSTEM

Pneumatic vacuum generators use compressed air to generate a vacuum through what's known as the venturi effect. This effect, which is named for an 18th and 19th-century Italian physicist, can do quite a bit of work for your organization. In certain circumstances, you could connect a vacuum generator in an extremely efficient manner

For instance, you could use a vacuum force to move powders to transfer different types of debris. This would keep a particular industrial process free of any contaminates. On the other hand, you might be interested in making use of any of a whole set of actuators and other parts that run on the vacuum force in addition to positive airflow.

- **Test Run**

The special feature of the project is just can be vacuum if someone need it to be a vacuum. We make the advance vacuum light weight as we can because it can be use

easily while someone use it. People just need to install it at the top nozzle air blower machine. Then people just need to carry it like they do the something when use air blower machine.



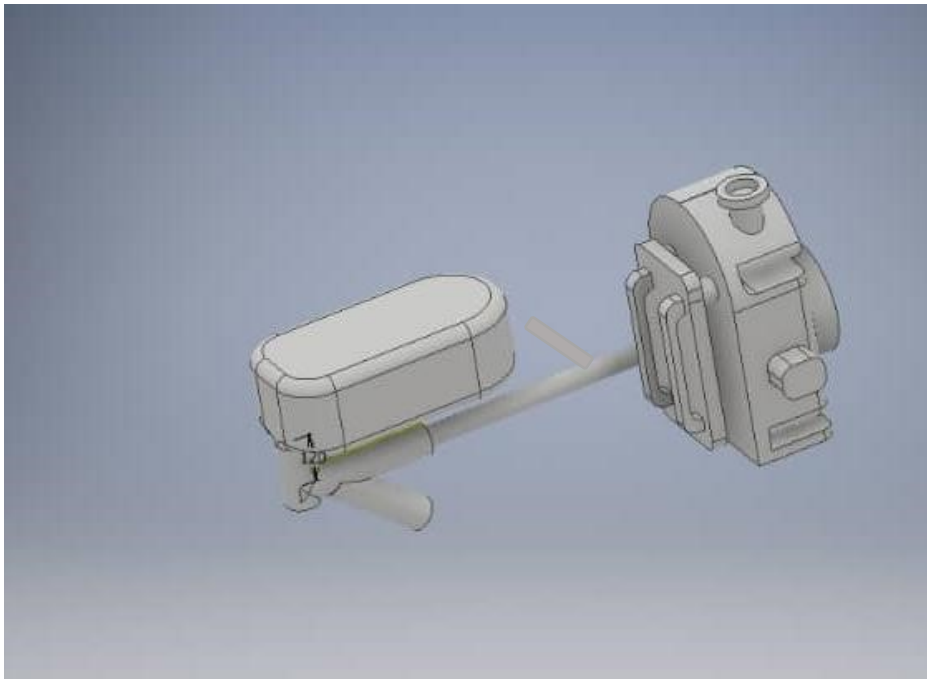
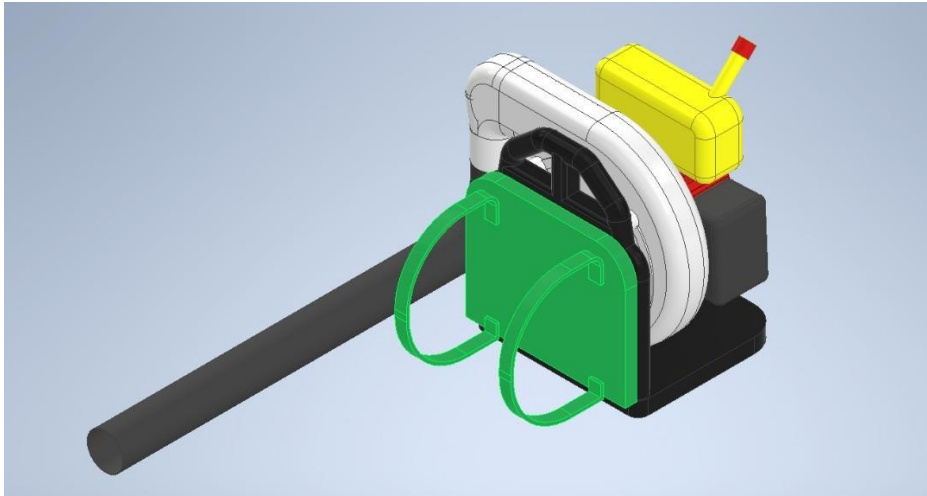
- **Analysis Data**

The process of evaluating data using analytical and logical reasoning examine each component of data provided. This form of analysis is just one of the many steps that must be completed when conducting a research experiment. Data from the test runis gathered, reviewd and analysed to form findings, discussion and conclusion.

- **Report Writing**

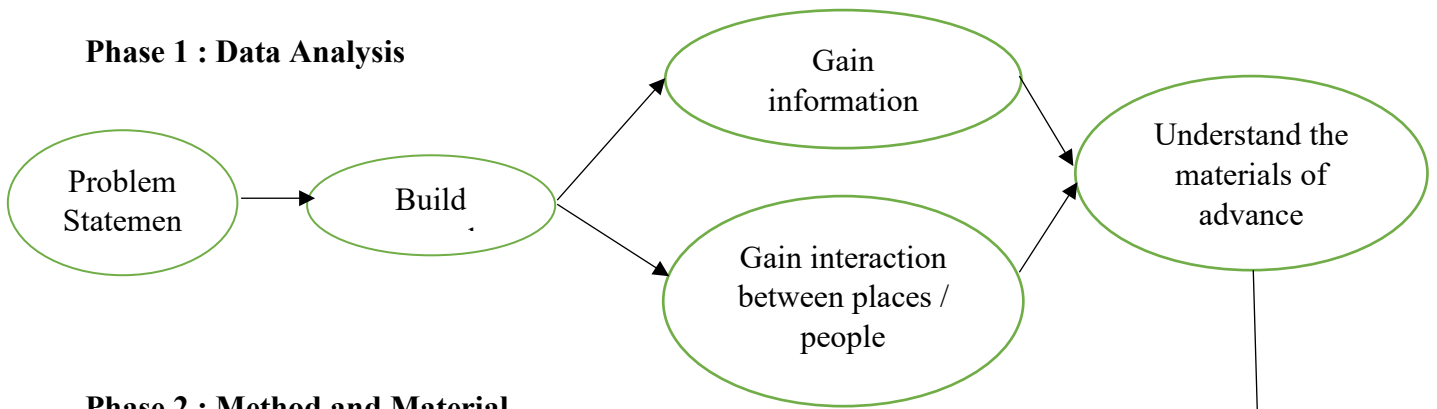
Report writing is one of the most crucial step in every project invented. It is important to make a report based on the project, test run and analysis so that future improvements nor expansion of knowledge could be done. Our report writing is based on the analysis and findings that we collected throughout this whole process of completing this project.

3.4 PRODUCT DESIGN

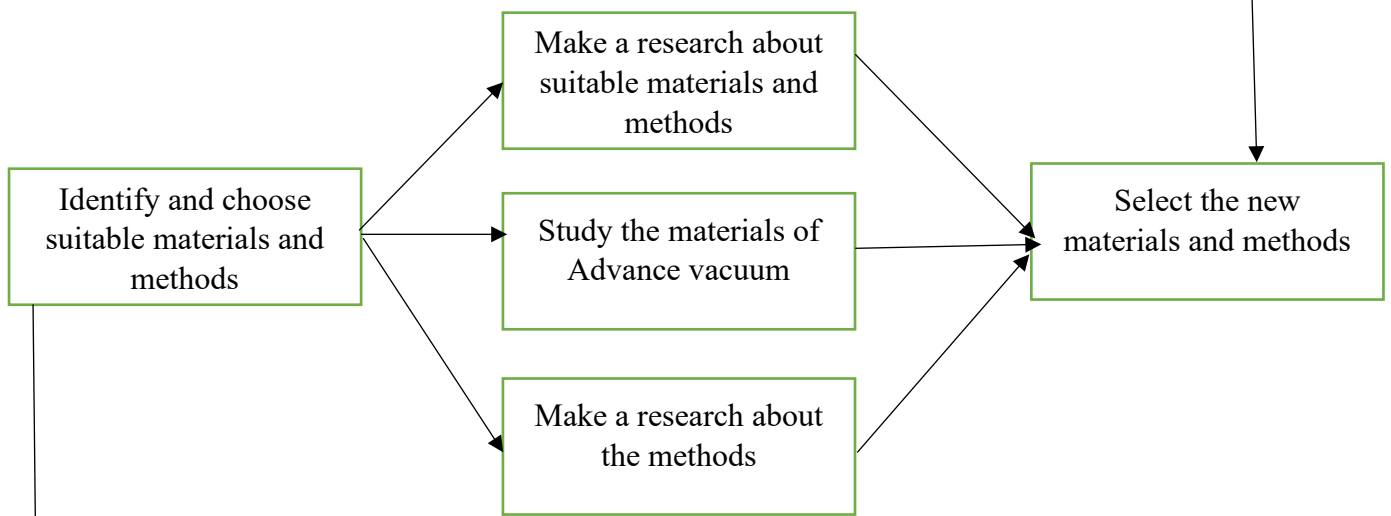


3.6 METHODOLOGY PHASE

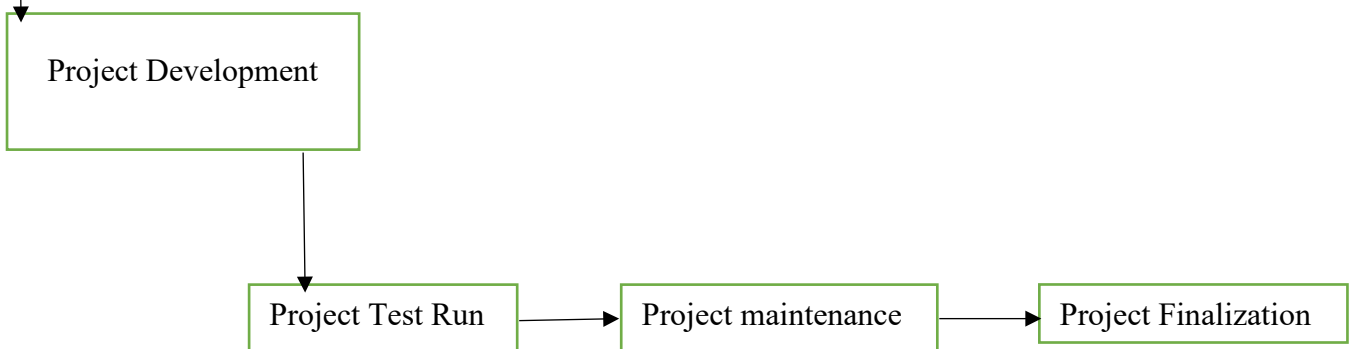
Phase 1 : Data Analysis



Phase 2 : Method and Material



Phase 3 : Preliminary Study



3.7 BUDGET CALCULATION

No	Materials / Equipment	Amount	Price
1	Blower	1	300
2	PVC	2meter	50
3	Gam PVC	2	40
4	Plastic garbage XL/Gunny bag	1bag	10
Total			RM400

Table 3.7.1

3.8 PROJECT ACTIVITY

MINGGU	M1	M2	M3	M4	M5	M6	M7	M8	M9	M10	M11	M12	M13	M14	M15
Project (Thinking and briefing the name of project)	/	/													
Literature review (Review some problem of product in life)			/	/											
Methodology (Planning to complete the good product)					/	/									
Problem statement (Show the problem of product)				/	/	/	/								

Objectives (To make easier for the patient use the stand)				/	/	/	/	/							
Survey component (Survey in internet and ask at the shop)									/	/	/				
Conclusion (Solve the problem and our objective success)											/	/			
Presentation (Present the idea with the best reasons why the product more innovative)														/	/
Submit proposal to supervisor														/	/

3.9 SUMMARY

In conclusion, the approaches used in this project are very critical and necessary for the success of the project. Thus, as mentioned, this project is approved and acknowledged by Mr Zulkarnain. The materials used in the project would make a duo pipe to create a duo function nozzle that can be blower and vacuum. This project is also very convenient when we build a pneumatic device and concept in our project to establish a pneumatic vacuum without modifying the circuit.

CHAPTER 4

FINDINGS AND ANALYSIS

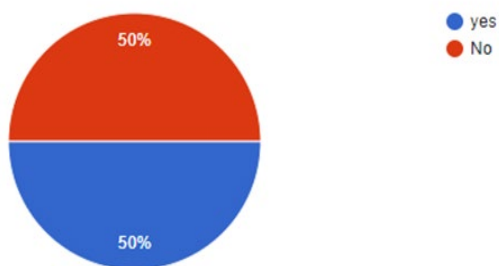
4.1 INTRODUCTION

This chapter combine data and analysis of the advance vacuum and its materials . This data and analysis are very important for this project to achieve the objectives and scope of the project. This data indicates the successful results of the materials testing. After getting all of this data, we analyze every single possible to make it perfect.

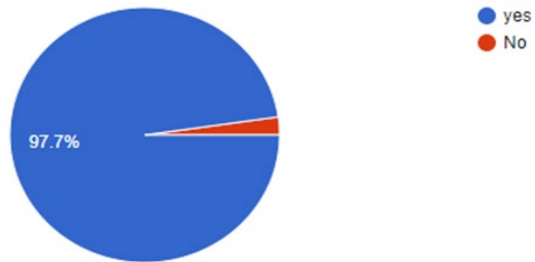
4.2 ANALYSIS OF SURVEY

A survey has been done to identify what improvement needed and this project is good to do. This can help us to produce a good product that can help others.

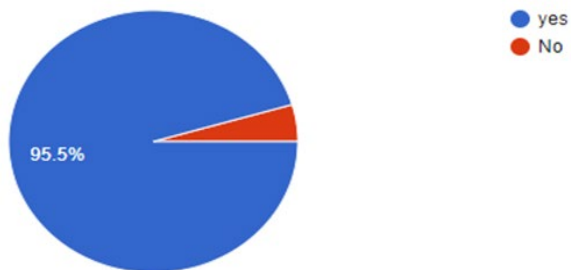
1. Have you ever used air blower?



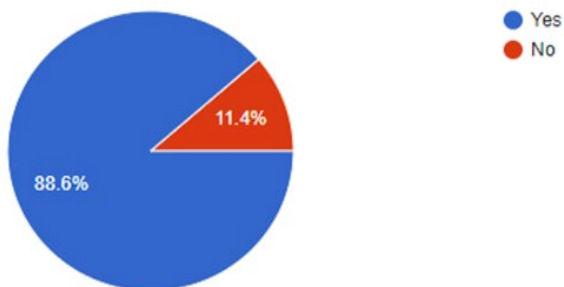
2. Do air blower need to be improve and redesign to make it as a vacuum?



3. By develop a pneumatic vacuum into air blower, do you think it can make it easier functional for a user?



4. Have you ever has problem such as leaves, garbage and dust collected ever been blown away?



4.3 ADVANTAGE AND DISADVANTAGE

Every project has its own advantages and disadvantages , the advantages of our project which our project can be used for a vacuum or blower . Not just that , it also does not produce dust that can pollute the environment

However, the disadvantages it sounds a bit noisy and relatively expensive which must be improved or change for the future so that we could enhance the good and very efficient product that hardly to find disadvantage of the project.

Advance vacuum has a lot of advantages to help gardeners and environmental workers. Besides of the advantages, this project also disadvantages that we must overcome it in the future for the better product .

4.4 CHAPTER'S SUMMARY

As a conclusion for this chapter, the analysis and findings have been made. This advance vacuum has a lot of advantages however there are every cons to pros. Hence, the challenges are taken as a room for improvements and more developments for future generation and well as to enhance their knowledge on the project we carried out. Test run is carried out to determine the fullest potential of nozzles wether it well functions when the vacuum was turn on.

CHAPTER 5

DISCUSSION , CONCLUSION AND UPGRADE PLAN

5.1 INTRODUCTION

This chapter explains about discussion , conclusion and upgrade plan all together for the project . From the data from the test run of the project, the analysis have been done. Hence, the discussion from all the results of test run and analysis will be explain in this chapter. Then , the conclusion will be made based on the discussion and upgrade plan that have been made.

5.2 DISCUSSION

Before we start this project, there are few steps that need to be taken to complete this project. One of them is the design process. Based on the survey we received before that, we began planning this project together and selecting the best one. We agree to use a more ergonomic version of a bag instead of a handheld blower The concept process of the backpack starts with a paper drawing that generates a concept and a successful solution that is accomplished through a visualization that is never achieved with the first shot or iteration. This is how we need to upgrade the air blower nozzle to make it two ways that can be used in duo roles and can be used as a blower and vacuum. This blower can create a pneumatic vacuum. Not just that, we upgrade by using a plastic bag as a pocket to catch debris such as dry leaves, grass clipping or small litter while the vacuum is sucking in. After the final drawing, the next method we use is autocad and inventor to do it. Our community had decided to use the inventor to make it possible to design the 3D and the real design.

Other than that, in terms of material selection, we have chosen suitable material for our project. We decided to use the pvc pipe as a nozzle material. This is because the pvc pipe is a lightweight, low-cost, durable thermoplastic that requires a twin-screw extruder due to the hardness of the raw material. PVC pipes are less sensitive to thermal expansion (extension) than other pipes. The method of cutting pvc pipe to the precise size that we want has become complicated because it is easily cracked. It makes the ends of the pvc surface to be too rough and irregular.

Then, we need to run the test several times to the duo nozzle mechanism to make sure the blower will produce a pneumatic vacuum. This is because it is very difficult to make the nozzle suck the dried leaves. The method has been complicated because the two-way nozzle must be in the right place. The size of pvc is too large and the shape of pvc is irregular impact

the blower to suck the leaves. In the nozzle, the velocity of the fluid increases at the detriment of the energy pressure. However, if we reduce the diameter of the pvc tubing, the weight will be light and the friction will be increased. This is because heavy weight can cause discomfort in the hand and make it impossible to manage. Also, the method of swallowing the leaves would be easier.

Last but not least, the finishing of our product may be enhanced by adding a shredder. By this way, the customer can get a thorough solution for all backyard cleaning issues. Holding the lawn tidy all year long, these machines boast speedy throttles that the crunch leaves together. In the basis of all the talks, a lot of progress needs to be made in order to improve product consistency in the future.

5.3 CONCLUSION

In conclusion, we have created this project on the basis of the challenges encountered by our own users. This innovation will reduce the challenges faced by customers and the environment. As stated in the proposal, this project is therefore agreed and accepted by Mr Zulkarnain. This specialized vacuum is perfect for outdoor usage as we focus more on the outside and can sweep grass, dry leaves and small litter. In the future, we would like to see a comprehensive use of this project, particularly for gardeners and environmental cleaners with the recommended ergonomic design. Both updates and enhancements can be made so that the project will deliver more advantages and benefits. Therefore, hope that this initiative will be able to expand more across all the future projects.

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- <https://youtu.be/oY3NN1QES14>
- <https://canary.contesting.wish.com/api/webimage/5da7c422a44f6c063e076e08-5-large.jpg>