



FACULTY OF MECHANICAL ENGINEERING

DIPLOMA IN MECHANICAL ENGINEERING

(PROJECT 2 DJJ 6143)

FINAL REPORT OF :

FLOUR SIEVING

MACHINE

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FLOUR SIEVING MACHINE

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A project submitted in partial fulfillment of requirements for the award of
Diploma in Mechanical Engineering

MECHANICAL ENGINEERING DEPARTMENT

DECLARATION OF AUTHENTICATION AND OWNERSHIP

TITLE : **FLOUR SIEVING MACHINE**

SESSION : JUNE 2020

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ABSTRACT

Sieve is a device for separating wanted elements from unwanted material or for characterizing the particle size distribution of a sample, typically using a woven screen such as a mesh or net. A lot of the sieve product that are in the market are money consuming. Skilled workers are also required to operate the product. Other than that, it is also required big space to install the product. A higher maintenance for the product is also one of the problem that a lot of the user face. The aim of this study is to design a product that are compact and less space consuming. Price of the product also must be affordable especially for small industries. Finally, a low maintenance that can equal with less money consumption. The first part for our methodology of research is to compare all the product that are in the market. Second, create a design that satisfy the objective. After finalizing the design, search material that are suitable for the spec of the product. Finally, create the product and run test on small industry to collect data and analysis. All the data and the analysis that are obtained are use to write a report. The finding that can be gain after the test is that the flour sieving machine is suitable for small industry to use because it satisfies their requirements without exceeding the need. There are lot of improvement that can be done on this product such as make it portable, upgrade the motor and larger capacity.

Keyword: small and compact, portable, affordable

ABSTRAK

Pengayak adalah alat untuk memisahkan elemen yang dikehendaki dari bahan yang tidak diinginkan atau untuk mencicirkan taburan ukuran zarah sampel, biasanya menggunakan layar tenunan seperti mesh atau jaring. Sebilangan besar produk ayak yang ada di pasaran memakan banyak wang. Pekerja yang mahir juga diminta untuk mengendalikan produk. Selain itu, ia juga memerlukan ruang yang besar untuk memasang produk. Penyelenggaraan yang lebih tinggi untuk produk juga merupakan salah satu masalah yang sering dihadapi oleh pengguna. Tujuan kajian ini adalah untuk merancang produk yang ringkas dan kukuh. Harga produk juga mesti berpatutan terutama untuk industri kecil. Akhirnya, penyelenggaraan rendah yang setara dengan penggunaan wang yang lebih sedikit. Bahagian pertama untuk metodologi penyelidikan kami adalah membandingkan semua produk yang ada di pasaran. Kedua, buat reka bentuk yang memenuhi objektif. Setelah menyelesaikan reka bentuk, cari bahan yang sesuai dengan spesifikasi produk. Akhirnya, buat produk dan jalankan ujian pada industri kecil untuk mengumpulkan data dan analisis. Semua data dan analisis yang diperoleh digunakan untuk menulis laporan. Penemuan yang dapat diperoleh setelah ujian adalah mesin pengayak tepung sesuai digunakan oleh industri kecil kerana memenuhi keperluan mereka dan mampu milik. Terdapat banyak peningkatan yang dapat dilakukan pada produk ini seperti menjadikannya mudah alih, menaik taraf motor dan kapasiti yang lebih besar.

Kata Kunci: ringkas dan kukuh, mudah alih, mampu milik

NO.	CHAPTER / TOPIC	PAGE
1	CHAPTER 1 – INTRODUCTION	
	1.1 – Introduction	1
	1.2 – Problem statement	2
	1.3 – Objective	2 - 3
	1.4 – Scope	
	1.5 – Contribution	3
1.6 – Summary Of Chapter		
2	CHAPTER 2 – LITERATURE REVIEW	
	2.1 – Introduction	4
	2.2 – Previous research	4
	2.3 – History	5 - 6
	2.4 – Research on type of sifter	7 - 9
	2.5 – Equipment in Flour Sifter	10
	2.6 – Operation Design	11
	2.7 – Summary Of Chapter	12
3	CHAPTER 3 – METHODOLOGY	
	3.1 – Introduction	13
	3.2 – Flow chart	15
	3.3 – Methodology Phases	16
	3.4 – Safety Measures	17
	3.5 – Project Budget	17

	3.6 – Project Operational	18
	3.7 – Project Planning (Gantt Chart)	19 - 20
	3.8 – Summary Of Chapter	21
4	CHAPTER 4 – RESULT & ANALYSIS DATA	
	4.1 – Introduction	22
	4.2 – Tools Used	23 - 26
	4.3 – Results	27
	4.4 – Summary of Chapter	28
5	CHAPTER 5 – DISCUSSION, CONCLUSION AND UPGRADE PLAN	
	5.1 – Introduction	29
	5.2 – Discussion	
	5.3 – Conclusion	30
	5.4 – Upgrade Plan	
6	REFERENCE	31

CHAPTER 1

INTRODUCTION

1.1 INTRODUCTION

A sieve is a device for separating wanted elements from unwanted material or for characterizing the particle size distribution of a sample, typically using a woven screen such as a mesh or net. This project focuses in design, fabrication of the mechanical part of machine and the system of the sieve machine.

To achieve this project objective, this sieve machine body structure and mechanical system needs to concern some other criteria such as strength, safety and ergonomic design. Sieving machine is a machine designed to separate the particle according to their mesh size different levels. In many industries for example the pharmaceutical, it is often desirable to community particulate matter.

A small sieve such as used for sifting flour has very small holes. Depending upon the types of particles to be separated, sieves with different types of holes are used. Sieve are also used to separate stones from stand.

A metallic plate or sheet, or other similar device, with regularly spaced apertures of uniform size, mounted in a suitable frame or holder, for use in separating material according to size. A number used to designate the size of a sieve, usually the approximate number of openings per inch. The normal size of openings usually between cross wires of a testing sieve.

1.2 PROBLEM STATEMENT

Sieve is one of the common cooking utensils that every household and bakery shop has in their kitchen. One of the main problems of the sieve is it required a lot of human energy and requires a long time to sieve the flour.

This will make the user feel tired quickly make it a massive chore to do. In addition to this, if the bakery or household that want to sieve a large amount of flour. The sieve cannot sieve in a large amount due to their size and capacity. The user that wants to sieve the flour needs to do it little by little to sieve the flour.

Furthermore, this also will impact the bakery production line and manufacturing. This is because the manual sieve is inefficient to use to make a lot of product that is needed to be made due to its lack in certain aspects. This will make the bakery keep their production in line.

1.3 OBJECTIVE

The objectives of this project are:

- To design and develop a prototype of electric powered sieve machine that are easy to use.
- To design and develop a prototype of electric powered sieve machine that can sieve a large amount of flour at the same time.
- To test the ability of the prototype electric powered sieve machine in solving the problems.

1.4 SCOPE OF THIS PROJECT

To ensure that this project runs smoothly and achieving the desired objectives, several scopes need to be followed among others:

- Design and build up electric powered sieve machine that can be used by a single press of button.
- Sieve machine that can sieve lots amount of flour.
- Powered by high battery voltage.

1.5 CONTRIBUTION

This machine will help a lot especially for those who are into baking and caterer business. It will decrease the burden of sieving and almost no man power are needed. Now sieve is just an easy task and doesn't need time to consume to do it. Besides, it will sieve a lot amount of flour that will ease every bakery industry.

1.6 SUMMARY OF CHAPTER

Flour sieving machine is a machine that will sieve flour efficiently. It has simple mechanic and very easy to use. It also will sieve a lot amount of flour and requires only a little time.

CHAPTER 2

LITERATURE REVIEW

2.1 INTRODUCTION

This chapter will provide a review about the previous research and existing project that have been made by using reference sources and guidelines as journals, internet, article writing, blog and scientific studies to get an idea about the project design, conception and any information that related to improve the project. With a differences concept and design, there are other creation and innovation of projects done by the other people. The research that is related to this project also covered in this chapter.

2.2 PREVIOUS RESEARCH

SIEVE

A sieve, or sifter, separates wanted elements from unwanted material using a woven screen such as a mesh or net. However, in cooking, especially with flour, a sifter is used to aerate the substance, among other things. A strainer is a type of sieve typically used to separate a solid from a liquid. The word "sift" derives from the sieve. Sieving or sifting a simple and convenient technique of separating particles of different sizes. A small sieve such as that used for sifting flour has very small holes that allow only very fine flour particles to pass through. The coarse particles are retained in the sieve or are broken up by grinding against the screen windows. Depending upon the types of particles to be separated, sieves with different types of holes are used.

There are several types of flour sifter, each with a different way to use it. The traditional type of flour sifter is the sifter shaker cup. As the name suggests the way to use the sifter is to shake the flour by using this to remove any clump from the flour. With a squeeze sifter, you squeeze the handle to release the flour through the mesh screen. The last one is the crank sifter. In most cases, bakers with arthritis or hand injuries prefer a crank model because it doesn't require as much hand strength to operate as a squeeze sifter. The benefit of a squeeze sifter is that it allows for one-handed operation. Our target in this project is to make a fully electric-powered flour sifter that is easy to use and save some processing time that is needed for a small bakery or household. Besides, we also will make some improvements to the flour sifter such as the mesh screen and the capacity of the machine.

2.3 HISTORY

Jacob Bromwell is a privately held American designer, manufacturer, marketer and distributor of kitchenware and household goods. Founded in 1819, it is the oldest housewares company in the United States. The company manufactures several historically significant products including the Original Popcorn Popper, Classic Tin Cup, and Legendary Flour Sifter. The Original Popcorn Popper is one of the company's oldest and best-selling items, and has been made with the original equipment and dies since the late 1800s when the company acquired the patent from William Wood, its inventor. They were originally sold at a wholesale price of \$3.50 for a gross. The Legendary Flour Sifter was patented in 1930 by a descendant of Jacob Bromwell's, Thomas G. Melish.



Figure 2.3.1: Thomas G.

Melish Jacob Bromwell (born 1785), a soldier of the War of 1812 and entrepreneur, moved from Baltimore, Maryland to Cincinnati, Ohio via the Ohio River on a flatboat. He became the first wire goods manufacturer when he established The Bromwell Brush and Wire Goods Co. in 1819 and filed for incorporation on February 12, 1883. The company supplied pioneering families with a multitude of household goods. He opened up his company in a six-story building at 181 Walnut Street in downtown Cincinnati, Ohio. The company occupied all six floors and boasted over 1,000 products in its catalogue, many of which won awards.



Figure 2.3.2: The legendary flour sifter

The Legendary Flour Sifter by Jacob Bromwell was still sold and use to this day. Nowadays there is a lot Of new design of flour sifter that is inspired by the legendary flour sifter. This shows that flour sifter gives an important impact on the industry such as the bakery. Without this invention, bakery and even homemade cake or cookies are hard to produce.

2.4 Research on type of sifter

- Crank Sifter



Figure 2.4.1: Crank Sifter

The crank flour sifter needs human energy to operate. we rotate the crank to rotate the wires that scrap the bottom steel mesh to break up and mix all the flour. It is a good product and ergonomic. Sometimes bakers love to use this because of bakers with arthritis or hand injuries can use this with ease.

- **squeeze sifter**



Figure 2.4.2: Squeeze Sifter

The squeeze sifter also need human energy to operate. when the handle is squeezed, the mesh screen in a bowl shape that is located in the cup will rotate and the flour will go through the mesh and eliminate any lump from the flour.

- **Flour sieve**



Figure 2.4.3: Flour Sieve

This next flour sifter is actually called a flour sieve as it has a completely different design. To use it, just place flour in the cake pan shape sifter and shake it back and forth to send the flour through the mesh screen.

2.5 EQUIPMENT IN FLOUR SIFTER

- **CARRIAGE**



The carriage is where the flour will be poured to be sifted. In the carriage a mesh screen is install to ensure the flour sieve into a fine particle and separate unwanted element.

- **BATTERY**



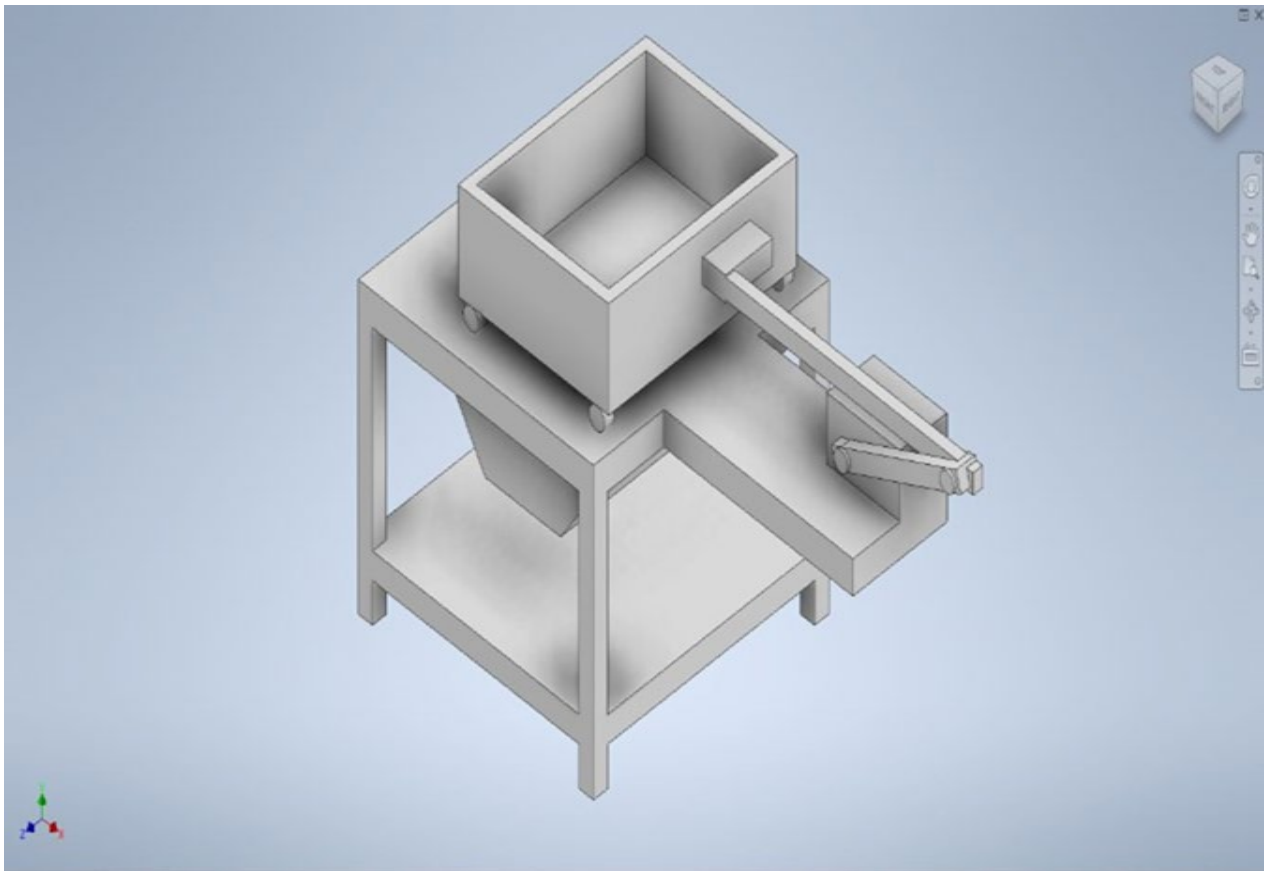
Battery are being used as power source to powered the motor to move the carriage in order to sieve the flour.

- **Motor**



The motor is used to move the carriage to sieve the flour.

2.6 OPERATION DESIGN



This design was made after doing some research and discussion to ensure the design can fulfil the objective of the project and the problem statement. After designing a lot of the prototype, this is the one that we choose that show the most potential to the success of this project.

2.7 SUMMARY OF CHAPTERS

In this chapter, it is an explanation on how literature reviews were done and the reasons why this project has been selected. There are many of case study stated and related to our project regarding to improve flour sieving machine. Since the traditional and common sieve use a lot of human energy, it will work less efficient. The existing sieve are less on productivity compared to flour sieving machine. Therefore, in chapter 3 there will be explanations of the methodology of project on how the project are made and assembles.

CHAPTER 3

METHODOLOGY

3.1 INTRODUCTION

Methodology is the rules or procedures used to implement the project in detail. This step is very important step in the implementation of this project to ensure the project is successfully completed at set times. Furthermore, in this chapter, there are many methods used in order to finish the project. In producing a project, this step that must be taken before the project is completed. These steps should be done with the utmost precision in order to produce a quality project. The result of this project, there are some steps have been made. The next topic is topics selection.

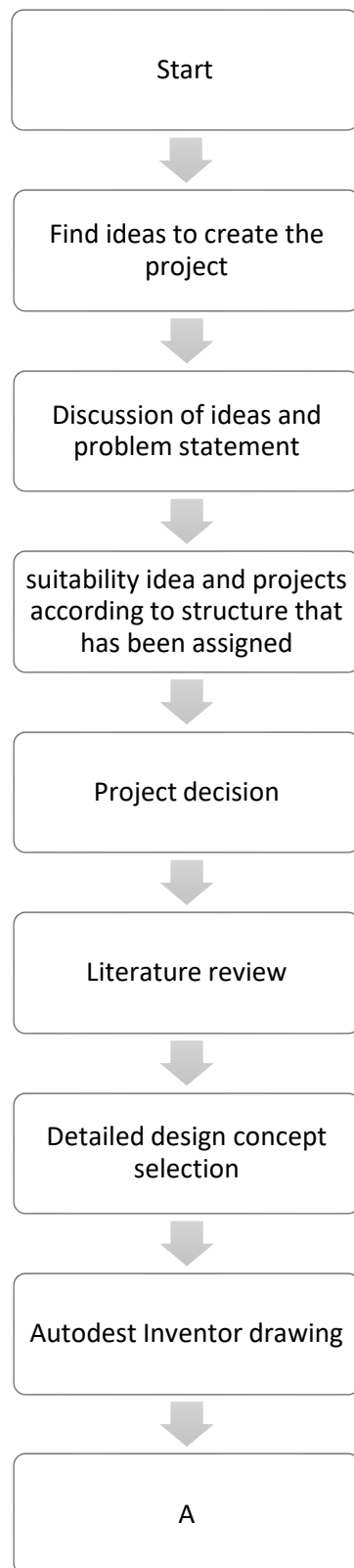
Selection of topics is very first step before starting work encountered work related to the project. The project title should be appropriate to the level sought diploma as a final project for the course Diploma in Mechanical Engineering.

In addition, the selection of appropriate projects to help power the creative and innovative thinking as well as it symbolizes the level of consciousness of a person.

After the project is selected, the title of the project should be selected based on its ability to attract others to know more about the project closely. Tittle that attracts the attention of others symbolizes the initial status of the project.

After an appropriate tittle is chosen, the step that must be taken is to choose components to the project to be made. This is because the materials are difficult to be found will have an impact on the projects to be made because it will probably take a long time to get it.

3.2 FLOW CHART



I

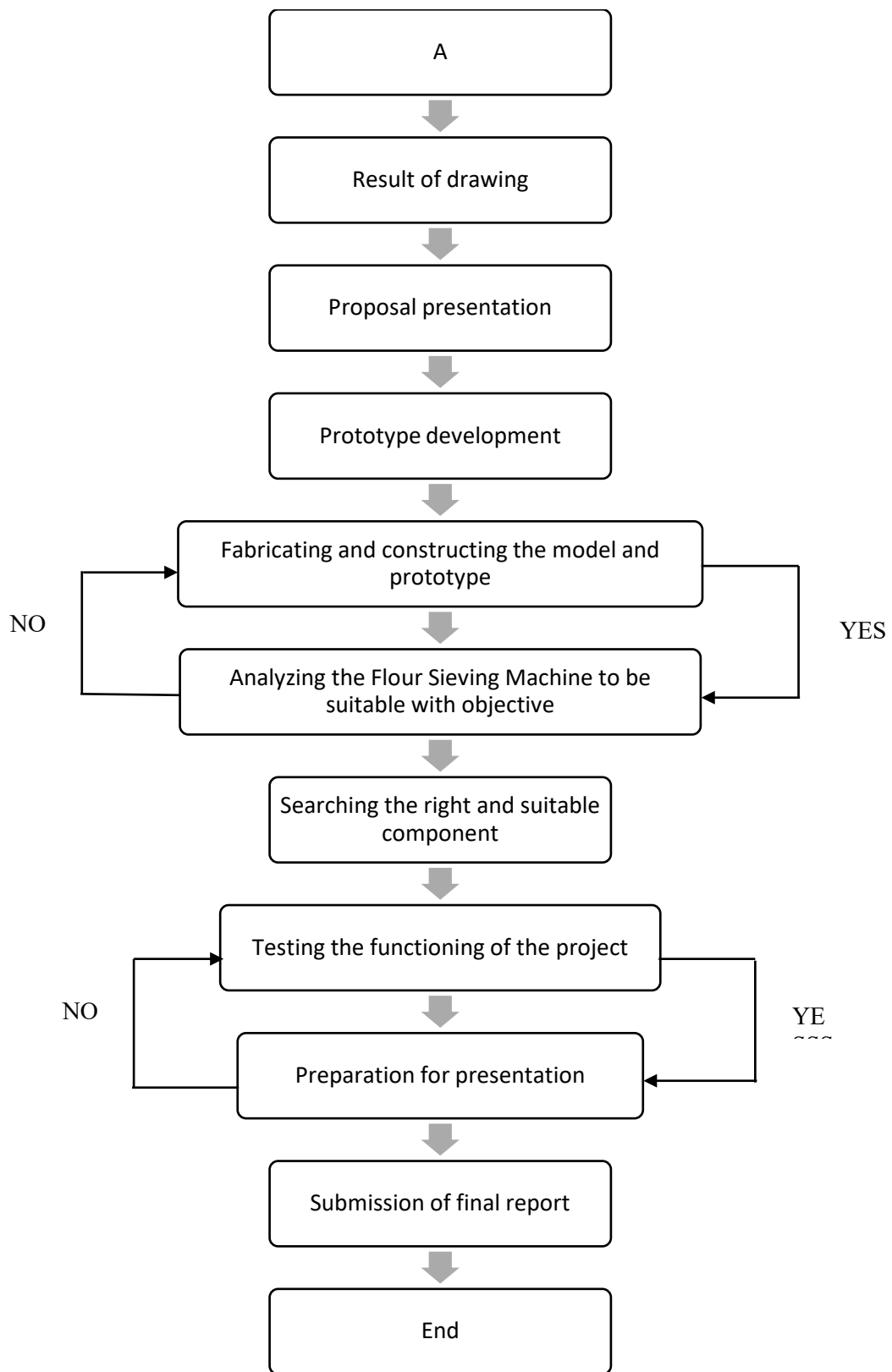


Figure 3.2.1: I & II Flow chart of the methodology

3.3 METHODOLOGY PHASES

i. Find ideas to create the project

Idea 1: Rain water filter

Idea 2: Corn cutter machine

Idea 3: Rod dispenser

Idea 4: Sand filter

ii. Discussion of ideas and problem statement

Idea 1: Not commercial to do this project

Idea 2: Many people have done this project

Idea 3: More process and complicated to do this project

Idea 4: Have no idea to innovate this project

iii. Literature review

The literature review is aimed to obtain information and data from previous researches to know the background and the problems of this project. With an earlier stage or studies, every problem can be identified and addressed. Therefore, a Flour Sieving Machine was established. It will assist one's work in baking. This project is more focused to a place like bakery and caterer.

iv. Generation and selection of concept

In a process of designing, generating and selecting design concepts need to be done in detail so that the project produced effective and a good impact on consumers. This is because effective project can be used in a long time and more durable.

v. Detailed design

Detailed design is done in order to ensure the project meets the requirements of users. In addition, it can follow all the aspects which have been set as not to drop out from the project scope. By doing this income, detailed design projects are more effectively.

vi. Availability and cost

In manufacturing process, the cost has to be emphasized that the expenditure does not exceed out from the expenses scope. Therefore, the importance of survey need to be done before selection of materials is made.

3.4 SAFETY MEASURE

Safety in operating the project toward the user is one of the important things that must be think about. The safety measure that have been done in this project is as follow:

- 1) Every sharp corner in the product has been grind to make it dull in order to avoid injuring the user.
- 2) The wheel on the product can be locked to ensure the product does not move when it being used.
- 3) A wall has been made to ensure the carriage does not derailed when it is powered on.

3.5 PROJECT BUDGET

Materials	Price
Motor	RM 100.00
Mesh Screen	RM 8.00
Aluminium	RM 35.00
Soft Steel	RM 15.00
Tire	RM 5.00
Battery	RM 38.00
Wire and Switch	RM 12.00

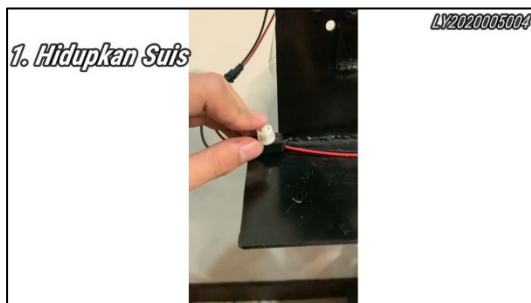
Table 3.5.1

3.6 PROJECT OPERATIONAL

1. Put the flour inside the mesh carriage.



2. Switch is turn on.



3. Carriage will move back and forth and sieve the flour.



4. Fine flour will land at the tray on the bottom.



3.7 PROJECT PLANNING

Project planning is important to ensure that all of work are done in time and perfectly.

GANTT CHART

WEEK	STATUS	W1	W2	W3	W4	W5	W6	W7	W8	W9	W10	W11	W12	W13	W14	W15
PROJECT ACTIVITY																
BRIEFING FOR FINAL YEAR	P	Planning														
	I	Implementation														
DISCUSSING INITIAL PROPOSAL	P		Planning													
	I		Implementation	Implementation												
LITERATURE REVIEW	P			Planning	Planning	Planning										
	I				Implementation	Implementation										
STUDY OF OPERATION	P					Planning	Planning	Planning	Planning							
	I					Implementation	Implementation	Implementation								
SURVEY THE COMPONENTS	P						Planning	Planning	Planning	Planning						
	I					Implementation	Implementation	Implementation								
PREPARE FOR PROPOSAL REPORT AND PROPOSAL PRESENTATION	P								Planning	Planning	Planning					
	I								Implementation	Implementation	Implementation					
PRESENTATION	P									Planning	Planning					
	I										Implementation	Implementation				
SUBMIT FINAL PROPOSAL REPORT AND PRESENTATION	P											Planning	Planning	Planning		
	I													Implementation		
PREPARE THE PROJECT	P												Planning	Planning	Planning	Planning
	I															Implementation

Table 3.7.1: Semester 4 Gantt chart

Legend:

Planning	Planning
Implementation	Implementation

WEEK	STATUS	W 1	W 2	W 3	W 4	W 5	W 6	W 7	W 8	W 9	W 10	W 11	W 12	W 13	W 14	W 15
PROJECT ACTIVITY																
DATA RESEARCH	P															
	I															
REQUIREMENT SYSTEM ANALYSIS	P															
	I															
CONSULTATION	P															
	I															
CIRCUIT DESIGN	P															
	I															
PROJECT IMPLEMENTATION	P															
	I															
CIRCUIT TESTING	P															
	I															
REPORT	P															
	I															
PRESENTATION	P															
	I															

Table 3.7.2: Semester 5 Gantt chart

Legend:

Planning	
Implementation	

3.8 SUMMARY OF CHAPTER

In this chapter, project planning and phases are made and being implemented during the project production in order to ensure the process go smoothly. It also helped to as a reference to ensure that we achieve the objective on time. Without a proper schedule, the production of the product will be delayed and the efficiency in making the product will dropped because of it. This show that methodology is one of the importance things that need to be done properly because it give a huge impact in this project.

BAB 4

RESULT AND ANALYSIS DATA

4.1 INTRODUCTION

This chapter describes the analysis of data followed by a discussion of research findings. The findings relate to the research questions that guided the study. Data were analyzed to identify. Data were obtained from self-administered questionnaires, completed by 30 respondents; 8 males and 22 females.

A total of 30 questionnaires were received, all of the questionnaires were usable for this study and met the required inclusion criteria as discussed in the previous chapter. Throughout the questionnaires, we need to know whether the respondent ever experience the gas leakage at home. From the data we will get to know the frequency of the gas leakage occur among 30 respondents. The purpose of analysis is to seek public opinion on our product and improve our marketing.

For questionnaires, there are part A and part B. Part A is demography where we need to know the details about respondents. We will get to know about respondents' gender, age, occupations and their experience experiencing the gas leakage. For part B, the questions will be asking about our product whether it is useful, effective and good to be marketed.

4.2 TOOLS USED

4.2.1 Gas metal arc welding (GMAW),

Gas metal arc welding (GMAW), sometimes referred to by its subtypes metal inert gas (MIG) welding or metal active gas (MAG) welding, is a welding process in which an electric arc forms between a consumable MIG wire electrode and the workpiece metal(s), which heats the workpiece metal(s), causing them to melt and join. Along with the wire electrode, a shielding gas feeds through the welding gun, which shields the process from atmospheric contamination.



Figure 4.2.1.1 Gas metal arc welding (GMAW)

4.2.2 WELDING GLOVES

A glove is a garment covering the whole hand. Gloves usually have separate sheaths or openings for each finger and the thumb. Gloves protect and comfort hands against cold or heat, damage by friction, abrasion or chemicals, and disease; or in turn to provide a guard for what a bare hand should not touch.



Figure 4.2.2.1 Welding Glove

4.2.3 WELD FACE SHIELD

A face shield, an item of personal protective equipment (PPE), aims to protect the wearer's entire face (or part of it) from hazards such as flying objects and road debris, chemical splashes (in laboratories or in industry), or potentially infectious materials (in medical and laboratory environments).



Figure 4.2.3.1 Weld Face Shield

4.2.4 MEASURING TAPE

A tape measure or measuring tape is a flexible ruler used to measure size or distance.



Figure 4.2.4.1 Measuring Tape

4.2.5 GRINDER

A grinding machine, often shortened to grinder, is one of power tools or machine tools used for grinding, it is a type of machining using an abrasive wheel as the cutting tool. Each grain of abrasive on the wheel's surface cuts a small chip from the workpiece via shear deformation.



Figure 4.2.5.1 Grinder

4.2.6 POWER DRILL

A drill or drilling machine is a tool primarily used for making round holes or driving fasteners. It is fitted with a bit, either a drill or driver, depending on application, secured by a chuck.



Figure 4.2.6.1 Power Drill

4.2.7 SCREWDRIVER

A screwdriver is a tool, manual or powered, used for screwing (installing) and unscrewing (removing) screws.



Figure 4.2.7.1 Screwdriver

4.2.8 “L” SQUARE

“L” Square helps to create accurate 90° angles and straight edges. It measures, rules, and squares simultaneously.



Figure 4.2.8.1 “L” Square

4.3 RESULTS

This project will overcome all of the problem that occurs as such below:

1. Man power needed to do the sieving process
2. Improvement productivity of a bakery
3. Save time to do sieving process
4. Amount of flour that can be sieve

The sieving process can be done easily and efficiently.

4.4 SUMMARY OF CHAPTER

This chapter discuss about all of the result that have been achieve. Hence, the tools that are used in making of this machine are one of the important things in order to get the desire result. It is necessary to choose the most suitable tool because it gives a big impact towards the project.

CHAPTER 5

DISCUSSION, CONCLUSION AND UPGRADED

5.1 INTRODUCTION

Through the research done to produce this project, this machine helps the problem that faced by the baker and help to improve their productivity in baking. More, this innovation also helps the demand for the machine and improve way to sieve from the existing sieving machine. A lot of the sieve product that are in the market usually costly and high in maintenance. A lot of simulation and test has been done to ensure that the product able to work and succeed to done the job. Plus, we also put some effort in design and material selection so that this machine able to reduce the accident or injury while operate the machine. This shows that the machine will have a complete design and safety feature. Lastly this project will able to sieve flour or any problem that include sieving

5.2 DISCUSSION

After finalizing the design, search material that suitable for the product specification we all know that this machine will be the great addition especially to the baker to help in bakery production line and manufacturing. Our target in this project is to make a fully electric-powered flour sifter that is easy to use and save some processing time that is needed for a small bakery or household. More, the project design was successfully proposed and fabricated according to designed material and fabrication method.

5.3 CONCLUSION

In conclusion, through the research done to produce this project, we can overcome the problem faced by baker an improve existing sieving machine to make easy to use although the main purpose of this machine to sieve flour , this project will also ensure that this machine is able to reduce the accident or injury to the user thus the machine will be accompanied by a complete design and safety features.

More the improvement that stated conclude that this machine also able to improve productivity hance the sales for the baker. Lastly, Lastly, this project will settle any problem that includes sieving

5.4 UPGRADE PLAN

BODY STRUCTURE

- There are few materials can be used to design the body of the machine. Selection od this material for this machine is really importance for the machine. A stainless steel will be the perfect instate of aluminum and food grade steel. This also will help to protect the quality of the flour and help the machine last longer

ELECTRIC MOTOR

- An electric motor is an electric machine that convert electric energy to mechanical energy. Electric motors can be power by direct current (DC) source. Such as power grid, inverters or electric generator. A resistance can be added to the motor so that the speed of the machine can be adjusted according to the volume of the flour and to control the fines of the flour.

MESH SCREEN

- A mesh is a barrier made of connected straded of metal or other flexible or ductile material. A mesh is similar to the web or a net in that it has many attached or woven strands. For the upgraded we can have variety of mesh to control the size of micro partical of the flour to sieve and can help to produce more fine flour.

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