DESIGN AND FABRICATE SIEVE MACHINE

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A project report submitted in partial fulfillment of the
Requirement for the award of the Diploma
Of Mechanical Engineering

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SUPERVISOR DECLARATION

I hereby declare that I have read this project report and in my opinion this project report is sufficient in terms of scope and quality for the award of the Diploma in Mechanical Engineering

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Position : SUPERVISOR

Date : …….

STUDENT'S DECLARATION

I declare that this thesis entitled "SIEVE MACHINE" is the result of my own study except as cited in the references. The thesis has not been accepted for any degree and is not concurrently submitted in candidature of any other degree

Signature : ……

Name : MOHD EFFI B MOHJEE

Date : ……...

DEDICATION

First of all, I would like to show my expression of gratitude to Allah S.W.T whose guidance, help and grace was instrumental in making and finish this final year project. I also would like to express my thanks to my supervisor Mr .JAMILUDDIN BIN JAAFAR whose help, guidance and advice me for the whole time during the process in finish this final year project. Without him, this project will not be completed.

I would also like to thank to my beloved father and my mother, MOHJEE B SUMAN and Mrs. NORIJAH BT TALIB without them, my pursuit of higher education would not have been possible and I would not have had the chance to study in mechanical course. Thanks a lot to my university and friends too in their support and advice towards this project. Last word from me, thanks to all for your enduring patience and continuous encouragement.

ACKNOWLEDGEMENTS

I would like to express my gratitude and appreciation to all those who gave me the possibility to complete this report. Special thanks to my supervisor Mr. EN.JAMILUDDIN BIN JAAFAR whose help, simulating suggestions and encouragement helped me in all time of fabrication process and in writing this report. And also thanks to dean faculty of mechanical engineering, associate Prof. Dr. Rosli bin Abu Bakar for his advice and suggestion.

I would also like to acknowledge with much appreciation the crucial role of the staff in mechanical laboratory, who gave me a permission to use the machine and to design the drawing and giving a permission to use all necessary tools in the laboratory.

Special thanks to Mr. Zamri bin Mohamed against as the final year coordinator, who has give some advise and share his knowledge on this final year project. Many thanks go to the entire DMM student especially to my friend for spending their time in helping and giving support whenever I need it in fabricating a sieve machine.

ABSTRACT

Idea to develop of sieve machine is come from the supervisor that gives a task and a title for this project. 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. This project flow must start from design, analysis, and lastly fabrication process Before develop the sieve machine, it must compare with other product in market. It is because to study the customer need and to create a new design with new feature. Diploma Final Year Project will cover for the whole last semester, before go to the industrial training to complete this project. This is an individual task and must do by ourselves. This is also one of opportunity to student to show or to apply their knowledge also skill in using manufacturing process and mechanical design software in complete this project. Time management and a good planning also important to make sure the entire plan are in their way. Lastly, discipline needed to complete this project.

ABSTRAK

Idea untuk membangunkan mesin penapis pasir datang daripada pensyarah FKM yang memberi tugasan dan tajuk untuk prjek ini. Projek ini memberi tumpuan kepada mereke cipta, memasang dan menganalisis mesin bahagian mekanikal dan sistem yang terdapat pada badan mesin penapis tersebut. Untuk mencapai objektif projek ini, struktur badan dan sistem yang terdapat pada badan pembuka durian tersebut haruslah berkaitan dan memenuhi beberapa criteria seperti kekuatan, keselamatan dan reka bentuk yang ergonomic.

Sebelum pembangunan mesin penapis pasir di mulakan, ia mestilah dibuat perbandingan di antara produk yang telah sedia ada di pasaran. Ini kerana untuk mengkaji tentang keperluan pengguna dan untuk menghasilkan bentuk baru dengan ciri-ciri yang baru.

Projek tahun akhir diploma ini akan meliputi sepanjang semester akhir sebelum pergi ke latihan industri untuk di siapkan. Ini adalah tugasan individu dan harus di siapkan sendiri. Projek ini juga salah satu peluang untuk pelajar menonjolkan diri mereka dan menggunakan ilmu serta teknik mereka dalam menggunakan proses pembuatan dan perisian mekanikal yang telah mereka pelajari untuk menyiapkan projek tahun akhir ini. Pengurusan masa dan perancangan yang baik juga penting untuk memastikan setiap yang dirancang berjalan mengikut jadual. Displin dan dedikasi juga diperlukan untuk menyiapkan projek ini.

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CHAPTER 1

INTRODUCTION

1.1 Project Synopsis

This final year project is part of the required subjects to be taken during the Diploma of Mechanical Engineering course. This is done during the final semester before advancing into the industrial training program. Therefore, it is vital to complete this project in order to receive a final grade depending on the effort put in.

The final year project is also to give students the individual ability and confidence to complete a task with under less supervision of lecturers. With this, students can learn problem solving skills in areas of designing; analysis, fabrication, and testing as well learn to do a complete formatted report which is important for future technical writing.

Sand or any mixture substand usually comes in different size and gred since some product required different size of sand or mixture that why this machine been design to sieve the sand or sub stand into different size depend on requirement needed.

1.2 Project Problem Statement

The problem of size of sand in the market available. need to spend more money if we want the sand in specific size or category it will increase the budget and time to wait the supplier preparing the goods.

Now days people always prefer the most suitable way to cut their cost and time. Example in a construction where they have to finish the work before the due date. His might be a problems. Since we have waiting long waiting for the good to arrive.

However, sometime in big company there are high tech machine that can do this work sieving any sub stand or mixture. But sometime in construction required a special sieve machine that are comfortable and easy o use.

1.3 Project Objective

There are several objective of this project as follow:

i. To design and fabricate new sieve machine
ii. Small and portable sieve machine
iii. Sieving into different size and grade

1.3.1 Specific Objective

i. Expose the real work must be done as future engineer
ii. To learnt how to arrange the time and budget
iii. To apply all knowledge in this fabrication

1.3 Project Scope

From the title that has been given, the development of this project must include how to design the mechanical part of machine using advance software like cad and solidworks and how to fabricate the system of this mechanical part. It also needs some knowledge and skill to finish the project. There is some other guide must followed to finish this project.

1.4.1 Literature Review – Got the information from internet that is related with this project. Such as

i. The history of sieve machine
ii. The type of sand and its size
iii. Machinery process used

1.4.2 Design Concept

i. Sketch the new design of sieve machine (consists of 4 designs). It base on customer needs
ii. Evaluated the designs and come out with the new design (final concept)
iii. Using the solid work software, make the isometric, orthographic and 3D drawing

1.4.3 Fabrication

a. the process used in fabrication :
    i. Welding: in this process, it uses to combine many part of material in the sieve machine fabrication
    ii. Drilling: to make a hole on the material
    iii. Cutting: to cut the material

1.4.4 Report Writing

i. Report writing will covered for the whole work progress from start until the end of the work
ii. Including all data analysis and specification

1.5 Project Background

Sand:

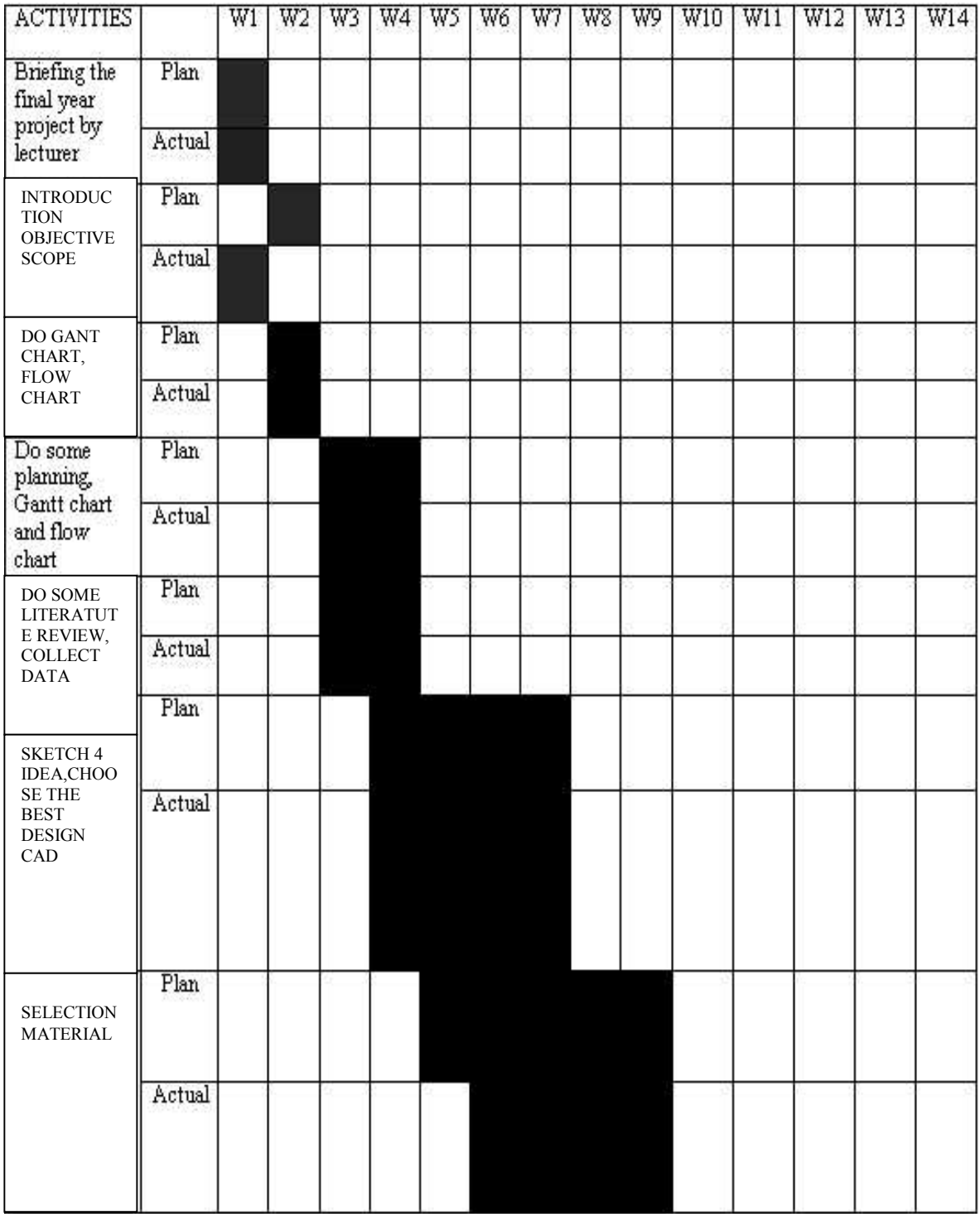
The sand is commonly known as the basic material use in construction side or any other product. Comes with few type and different size comes in mixture.

Sieve machine:

i. To design sieve machine that can sieve sand to different size.
ii. Problem that often faced is that some product required different size of sand to fulfill the quality level needed.
iii. Through this design user can save time sieveing sand and cut the cost to order the required size of sand.
iv. This product may sieve the sand with safety and quick over use conventional way
v. This product may sieve various of size sand and cut time and cost.

1.6 Project Schedule

Table 1.6.1: Gantt chart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Briefing the final year project by lecturer
Plan
Actual
INTRODUCTION OBJECTIVE SCOPE
Plan
Actual
DO GANT CHART, FLOW CHART
Plan
Actual
Do some planning, Gantt chart and flow chart
Plan
Actual
DO SOME LITERATUTE REVIEW, COLLECT DATA
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SKETCH 4 IDEA,CHOOSE THE BEST DESIGN CAD
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SELECTION MATERIAL
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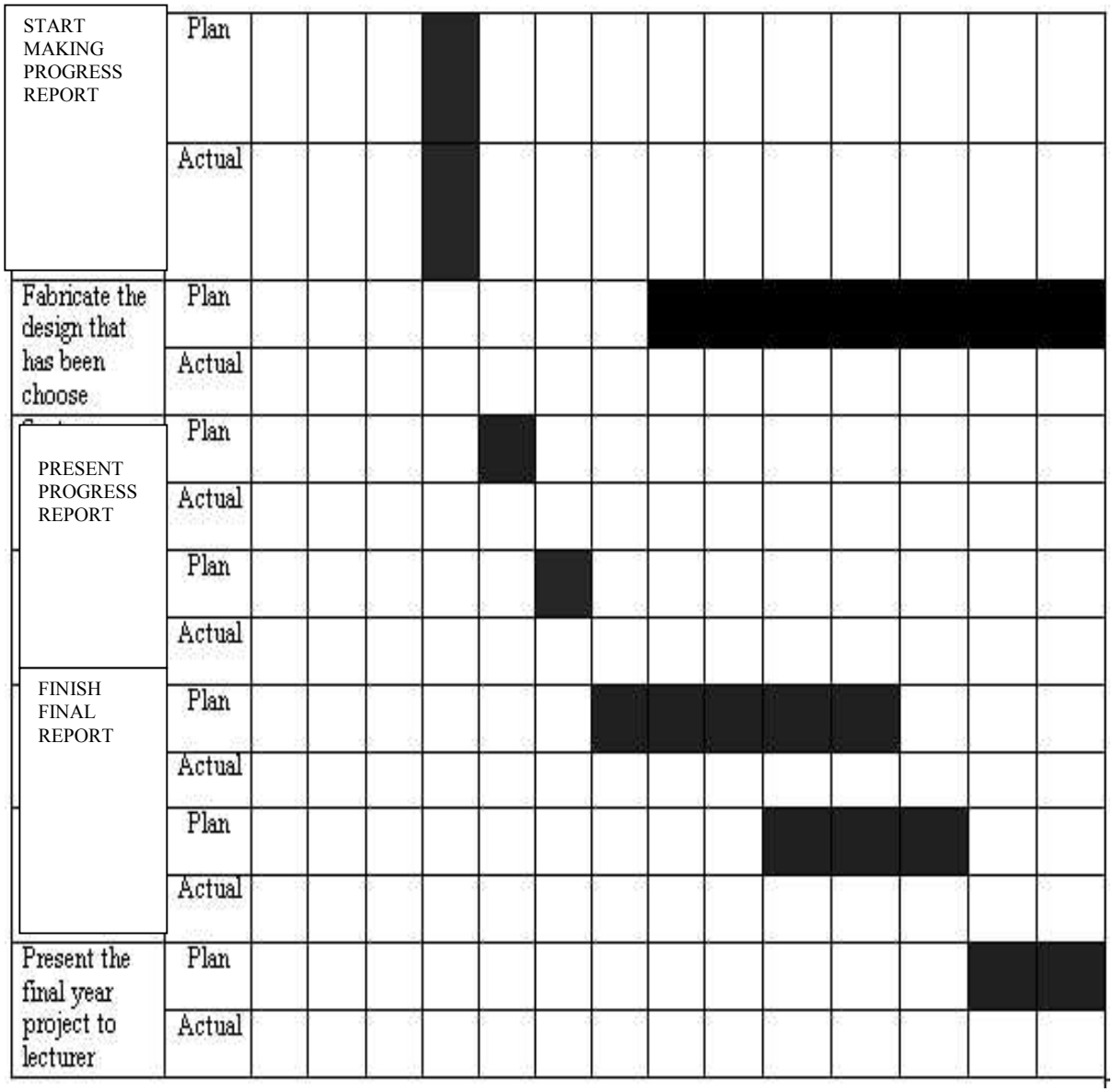

Referring the Gantt chart in table 1.6.1, this final year project start with some introduction or briefing by supervisor. Beginning week, need to do some schedule management for this project that covered for the whole week. It will be apply in Microsoft excel to make a Gantt chart.

After that, this project continuing with some literature review about the project. In this literature review, need or to gather all the information related with this project. Find the type, design, and the system used on the development of sieve machine .

It is also including the differences for each design in market. All the information gathers from internet, journal, reference book and people.

The project continued with design the concept of sieve machine. The designs come out using from all data collection, pugh concept and metric link before this. Try to evaluate or analysis the mechanical part of machine and the system for each design come out. From the all source, develop (engineering drawing) the final concept. Once again make an analysis to the final design body system.

After all information, data and detail drawing are improved, the fabrication process stage start. As the reference, we look at detail drawing to fabricate. The dimension and the material are already list on the drawing. In the fabrication of the sieve machine , it's need us to apply many knowledge and skills such as welding, drilling and cutting the material.

Lastly, the final report writing and prepare the final presentation. This takes about one week to arrange and accomplish. A report is guided by UMP thesis format and also guidance from supervisor.

CHAPTER 2

LITERATURE REVIEW

2.1 Introduction

Sand substance is one of the most important thing in industrial world. Nowdays the industry need the sand substand that are already been process known as sand product. As we know the sand substand are mixture with variety other compenent such as dirt and metal.

As we know the way sand is been collected still used the conversional way such as sieving using hand or machine. And human energy is needed to run the process. 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 sieve machine

From years sand has been the most important thing in human community. Most sediments, 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 traveled. In other words, large bits of gravel are plentiful on the banks close to the head of a river. As you travel down stream, 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 analyzing 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, 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 traveled. In other words, large bits of gravel are plentiful on the banks close to the head of a river. As you travel down stream, 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 analyzing 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, subduct to the Earth's interior (mantle) from trench with a subducting tectonic plate. However, some pieces tear loose from the whole, and accreted to the hangingwall 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 analyzing them, geologists are able to infer the geological history of the earth itself.

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Figure 2.1: Traditional way to abstract the sand

Figure 2.2: Hand sieve tool

The figure 2.1 above show the process 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 use 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.

Figure 2.2 show modified sieving method. It use handle to rotate and make the process sieveing more efficient . mainly use in small manufactured process such as in lab. Nowdays it has been upgrade using motor to replace the human power.Since this machine is important in our daily life it has been upgrade one bye one. And been marked almost all over the world.

Figure 2.3 modern sieve machine

Figure 3 above show modern sieve machine. Using the electrical motor it vibrate as it mechanism It has many different size layer so the sand comes in variety size. We just need to chose the size.The magnet also is installed in this machine to remove the any metal substand. Because metal can cause corrosion.

2.3 Process in fabrication of sieve machine.

This chapter is present about literature review of fabrication process such as welding, drilling, cutting and others. Before fabrication process, the material selection is crucial. The selection of joining is also important to get a product with better strength and durability.

2.4 Welding

2.4.1 Introduction

Welding is a fabrication process that joins materials, usually metals or thermoplastics, by causing coalescence. This is often done by melting the work pieces and adding a filler material to form a pool of molten material (the *weld puddle*) that cools to become a strong joint, with pressure sometimes used in conjunction with heat, or by itself, to produce the weld. This is in contrast with soldering and brazing, which involve melting a lower-melting-point material between the work pieces to form a bond between them, without melting the work pieces. A weld occurs when pieces of metal are joined by causing the interface to melt and blend prior to solidifying as a uniform metal joint. This process may be caused by heat, pressure or a combination of both. When heat alone is used the process is called fusion welding.

Pressure welding usually involves heating the surfaces to a plastic state and then forcing the metal together. The heating can be by electric current of by friction resulting from moving one surface relative to the other. The methods and equipment used for welding metal are also associated with cutting metal. There are a large number of welding and allied processes including the following.

2.4.2 Arc Welding (Shielded Metal Arc Welding)

Electric Arc welding is based on providing an electric circuit comprising the electric current source the feed and return path, the electrode and the work piece. The arc welding process involves the creation of a suitable small gap between the electrode and the work piece. When the circuit is made a large current flows and an arc is formed between the electrode and the work piece. The resulting high temperatures causing the work piece and the electrode to melt the electrode are consumable. It includes metal for the weld, a coating which burns off to form gases which shield the weld from the air and flux which combines with the nitrides and oxide generated at the weld. When the weld

solidifies a crust is formed from the impurities created in the weld process (Slag). This is easily chipped away.

There are several work pieces material requirements for arc welding;

- Have a well defined melting point
- Must electrically conducting
- Have a reasonably high thermal conductivity

2.4.3 Metal Inert Gas Welding (Gas Metal Arc Welding)

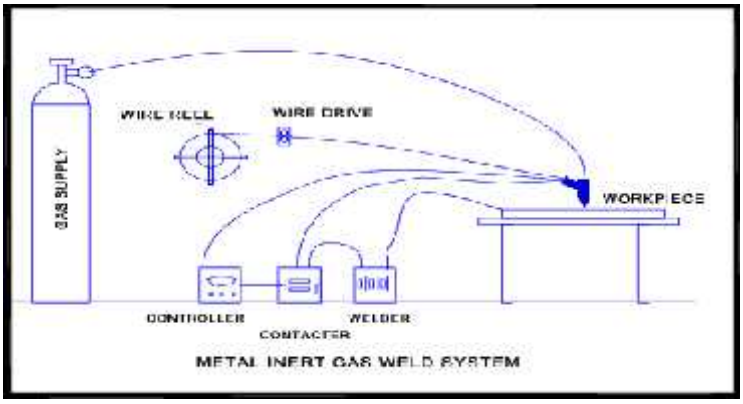


Figure 2.4.3 ; Arc welding

The Metal Inert Gas Process uses a consumable electrode of wire form and an inert gas shield of carbon dioxide when welding carbon steel. The wire electrode provides a continuous feed of filler metal allowing welds of any length without stopping. The inert gas shield eliminates slag and allows cleaner and stronger weld. This process is used widely for automated welding using robots. There are four primary methods of metal transfer in GMAW, called globular, spray, and pulsed-spray, each of which has distinct properties and corresponding advantages and limitations.

2.4.4 Tungsten Inert Gas Welding (TIG)

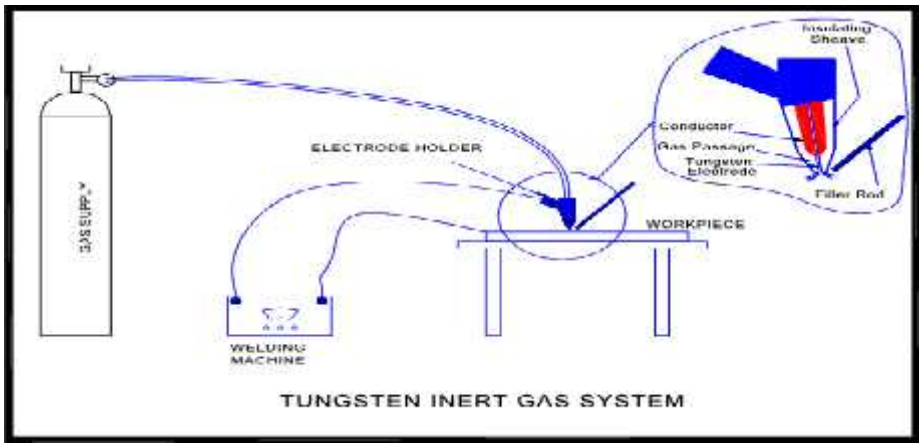


Figure 2.4.4 ; TIG

The Tungsten Inert gas (TIG) system uses a non-consumable electrode of tungsten and also provides an inert gas shield of argon or helium. This process was originally developed for welding magnesium and it is now used for welding aluminum, copper, stainless steel, and a wide range of other metals that are difficult to weld. Consumable rods may be used depending on the type of weld and the thickness of weld.

2.5 Drilling

Figure 2.5 ; Drilling machine

2.5.1 Introduction

A drill (from Dutch Drillen) is a tool with a rotating drill bit used for drilling holes in various materials. Drills are commonly used in woodworking, metalworking, and construction .

The drill bit is gripped by a chuck at one end of the drill, and is pressed against the target material and rotated. The tip of the drill bit does the work of cutting into the target material, either slicing off thin shavings (twist drills or auger bits), grinding off small particles (oil drilling), or crushing and removing pieces of the work piece (SDS masonry drill).

2.5.2 Drilling Process

A process and apparatus for drilling holes in hard materials in surgical procedures, comprising driving a drilling tool with a movement of alternating rotation with amplitude of less than one revolution. The tool can be driven from a motor having unidirectional continuous rot table movement through a converter which transforms this movement into the alternating rotation. The drilling tool can cover by a member which feeds the waste cutting materials rearward into an enclosed chamber. The apparatus can also be provided with a member that covers the drill during an insertion thereof through cut tissue prior to the drilling operation.

2.5.3 Type of Drill

There are many types of drills: some powered manually, others using electricity or compressed air as the motive power, and a minority driven by an internal combustion engine (for example, earth drilling augers). Drills with a percussive action (such as hammer drills, jackhammers or pneumatic drills) are usually used in hard materials such as masonry (brick, concrete and stone) or rock. Drilling rigs are used to bore holes in the earth to obtain water or oil. Oil well, water well, or holes for geothermal heating are created with large drill rigs up to a hundred feet high. Some types of hand-held drills are also used to drive screws. Some small appliances may be drill-powered, such as small pumps, grinders, etc.

2.6 Disc Cutter

Figure 2.6 : Disc Cutter

The present invention relates to a disc cutter machine, in particular for cutting sugar beet, comprising a machine frame, a disc cutter having a flat upper side and uniformly distributed passages for the cut product preferably longitudinal and extending in the radial direction, blade receivers arranged in the region of the passages, and a bearing and a drive for the disc cutter.

In disc cutter machines of the known type, the disc cutters usually consist of a steel plate from which rectangular sections are removed to form the passages for the cut product. In the passages, the blade receivers are inserted which carry the blades for the cutting process. As a result of the displacement of the bearing from the region of the center of the cutting disc moreover space is made available across the cutting disc for the drive as a result of which the constructional height is reduced.

CHAPTER 3

METHODOLOGY

3.1 Introduction

3.1.2 Project Flow Chart

In fabrication process, there is a planning of the overall progress to make sure the project can be finished on schedule.

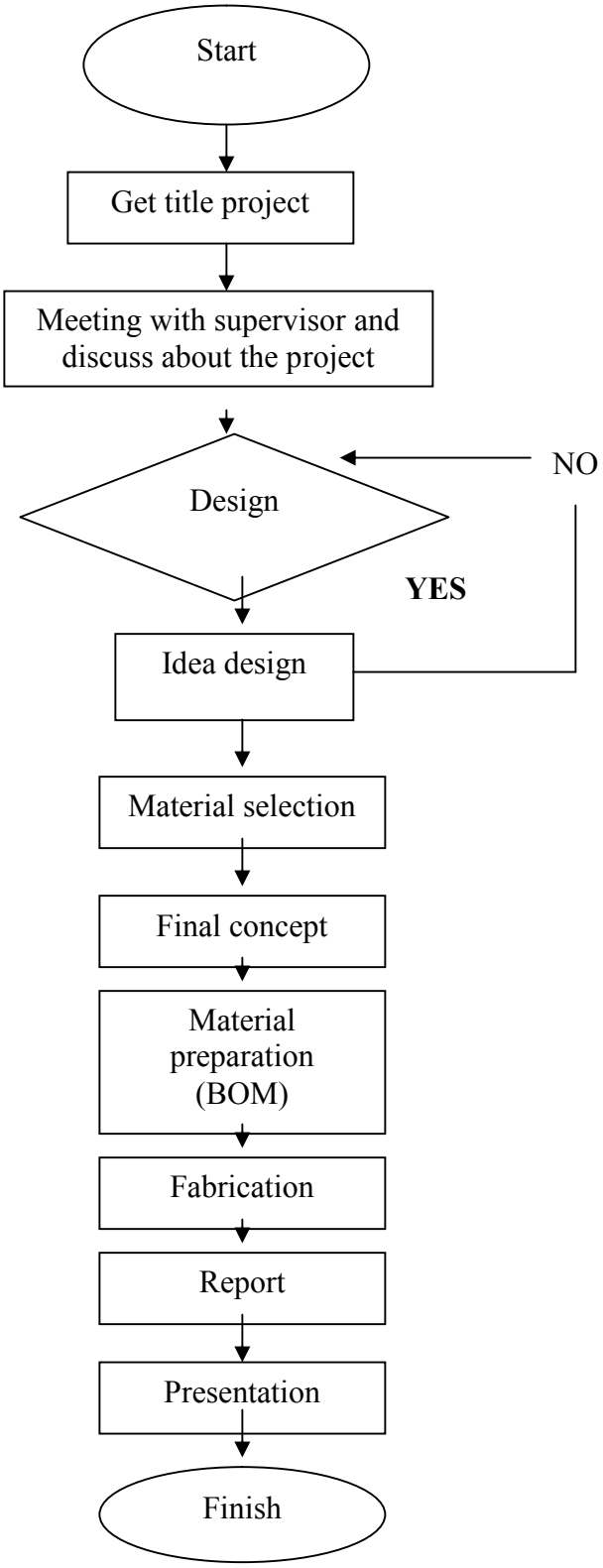


Figure 3.1 Flow Chart

From the flow chart above, this project started with discussion with supervisor about design. This discussion covering project overview supervisor and throw out opinion that related about title and supervisor instruct to proposed a certain design and concept before go up to next step.

Then start to make and decide the best idea about the title. Before that, literature review and research about title is the important point to get the best idea. Then study and make a lot of investigation about sieve machine. This includes a study about concept of sieve machine, process to fabricate, and material. These tasks have been done through study on the internet, books, and others information.

After gather and collect all related information and obtain new idea and knowledge about the title, the project would continue with the design process. In this stage, the knowledge and idea should throw out in sketching process. After several design sketched, the best design would be choose among previous design so that we could carry on designing process. Then the selected design would be transfer to engineering drawing using Solid Work software in order to for analysis process.

After that material preparation which is has been confirm initially. Purpose of this process is a to determine the suitable and follow the product and design requirement. This process covering purchased material, measuring material and cutting off based on requirement. Here, this process is important because the material would determine whether our product in way to failure or otherwise.

After all the drawing and material preparation done the next process is a fabrication process. This process based on dimension has been determined from drawing.During this process, all the manufacturing process which is suitable could be used such as drilling process, thread using lathe machine, welding process and cutting material using disc cutter.

Analysis stage has been implemented before fabrication stage. The evaluation is by considering the strength, portable, durability, safety and others.

After all process above done on schedule without any problem such as product defect all material for report writing is gathered. The report writing process covering and including all manners from week 2 until finished. This process also included the presentation for final presentation of the project.

3.2 Design and drawing

This drawing will explain about the design and sketching that had been chosen to be as the final idea to be produce or fabricate. All the design process in this project is going to be explained in details.

3.2.1 Design concept

The design of sieve machine must have based on much aspect actually. The design consideration must be done carefully so that the design can be fabricate easily and the system functioning. Then the material used in each design influence the selection thing because absolutely we need a lightweight material suitable with product size. The design is separated into three phases, firstly choose as many proposed design can be produce then choose 4 designs and try to improve it functionality and the last one is a new design with detail thing including dimension by using Solid Work software. Beside that the cost to design and fabricate must reasonable mustn't exceeded the budget given try to reduce waste .The criteria that must be considered in designing the sieve machine are:

- Durability: sieve machine must be durable when rotate and vibrate.
- Material : The material that will be used must be suitable to fabricate the Sieve machine and easy to get.
- Cost : It depends on material and manufacturing processes. It should reduce the cost to the minimum.

3.2.2 Drawing

The drawings are divided into two categories, which are:

i. Sketching-all the ideas for the sieve machine fabrication are sketched on the paper first to ensure that idea selection to be made after this.
ii. Solid Work Drawing-the final idea is drawn into the SOLID WORKS drawing format with details features.

3.2.3 Concept selection method

The sieve machine must trough process of concept selection method. It includes sketching three types of sieve machine that have certain characteristic and advantages. The sketches designs of the sieve machine are:

3.3.1 Propose design

Design 1

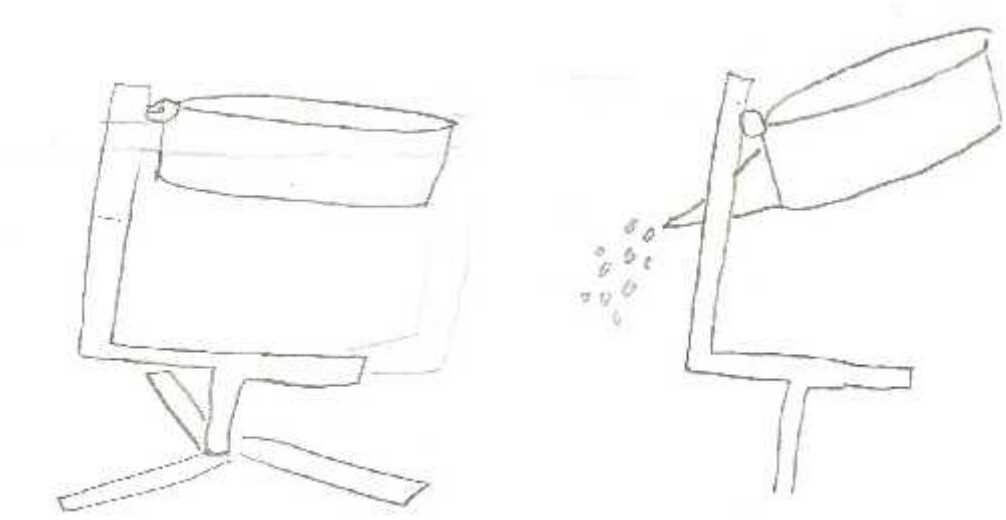


Figure 3; single arm

This design has a short range of stand which is so flexible to support the project from failing Down during process. This use a light material and easy to carry and store. The advantage is this design is easy to fabricate because less the core material used and the design is simple only consist few part . the disadvantages of this design is it unbalance due to single rod to hold the casing.

Design 2

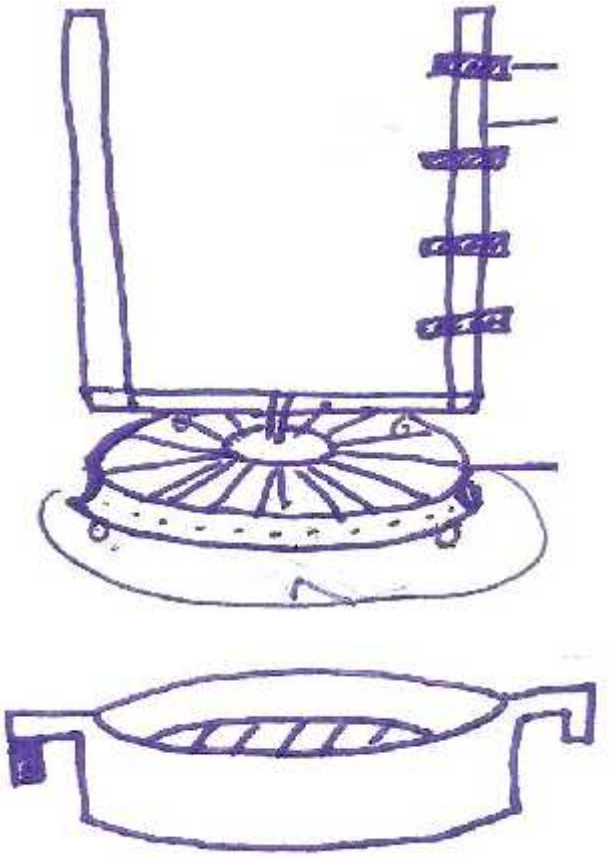


Figure 4; Double arm

This design are more stable and strong ,durable and give repeatable result. Its light weight which easy to handling and comfortable to use during experiment it also easy to storage after use. Its design is more versatile and follow up the new technology in the market the disadvantage of this design is has many part and hard to fabricate

Design 3

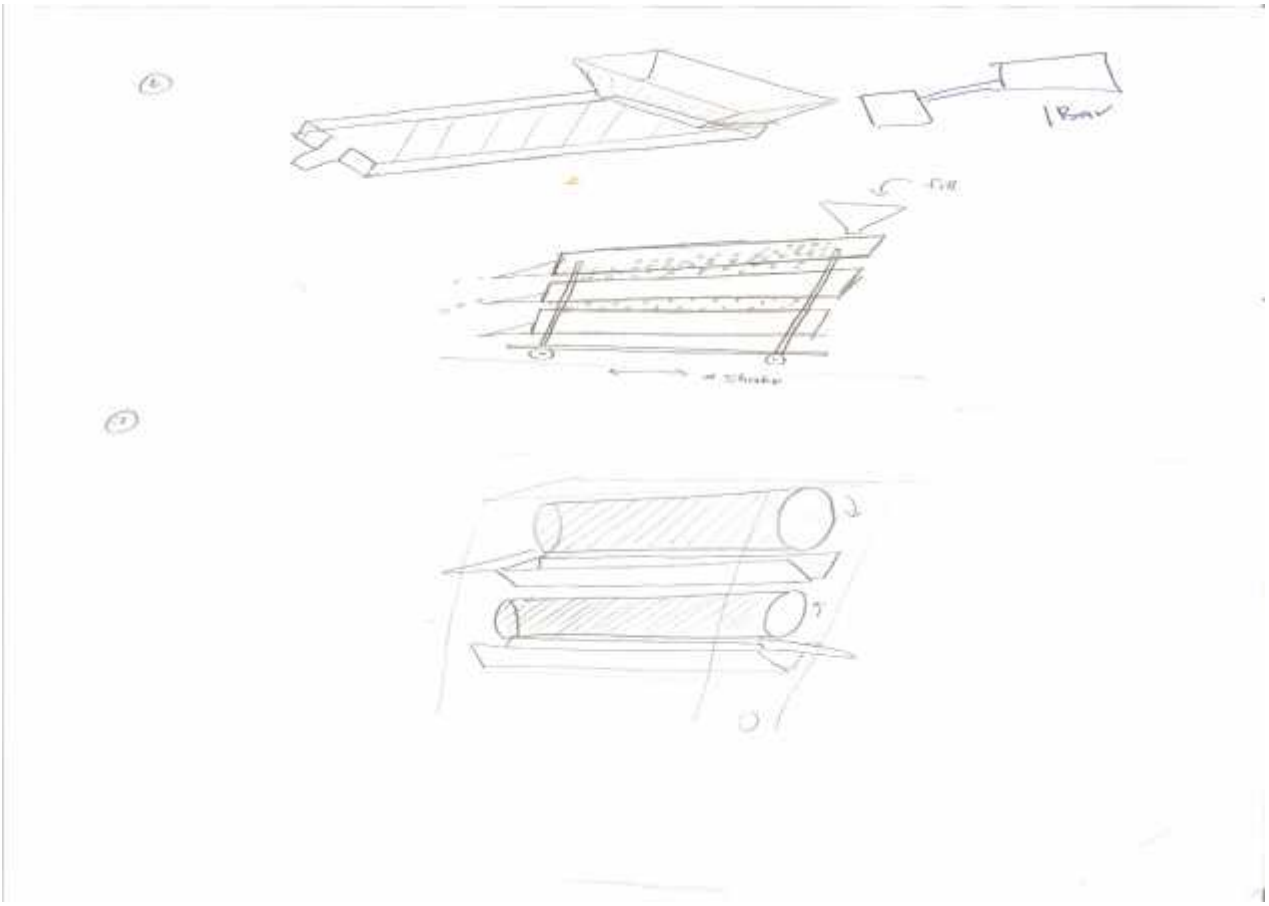


Figure 5; Conversional shape

In this design its is very strong and it can support more load and material. Accurate and fast. The component are big and easy to assemble and fabricate. But the cost is high and it size is big. Since our design need the simplest and small machine.

Design 4

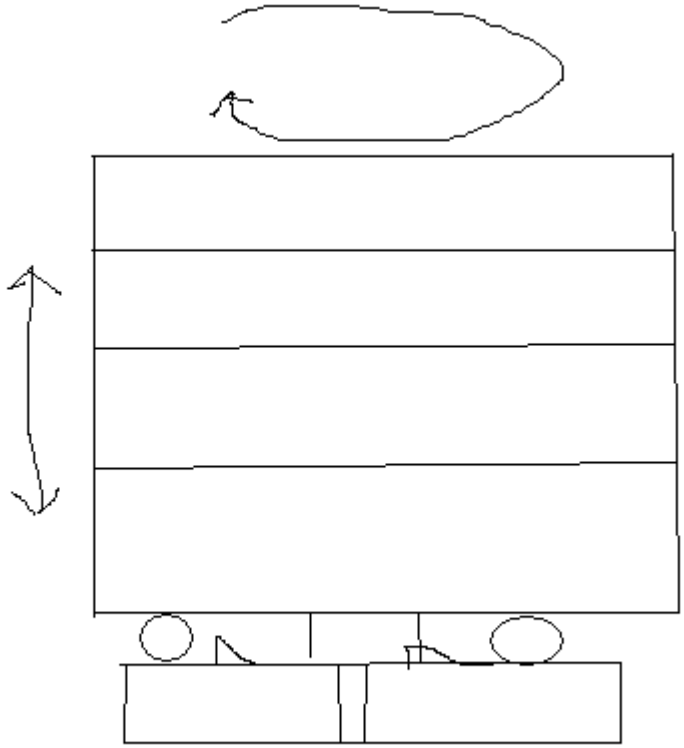


Figure 6; Cabinet shape

The figure above show the design referring the design of a cabinet design it has drawer as its container the part are little and easy to assemble and fabricate. It strong and stable. It can freely rotate and when the tire hit the angle it will produce vibration or shake movement. The disadvantage of the design is the free join is hard to work and don't work smoothly.

Result

From the design sketch, one of the best designs will be selected. It can be evaluated through several section criteria for it functions.

The first criteria are customer needs. It is important to know what customers want about this product. It is when product enter the market. Next selection criteria are easy to use.

Beside that, easy to manufacture also be an important criteria to select the design. It is include the process to fabricate the concept, the material that will use, the capability of the machine at FKM lab to fabricate the design and others

After that, cost of manufacture also has been considered as selection material. When the concept enter a market, cost is very important to attract customer to but it. Lastly the selection criteria are the strength or the product. The strength of the product can be known through the analysis.

According to the criteria above, the ‘ Design 4 ‘ have been selected as the best design. It is because the concept D can fulfill the criteria and have some advantages compared to design A, design B, and design C.

3.3.4 Concept Generation and Evaluation

Selection Criteria	Concept A	Concept B	Concept C	Concept D
Easy to handling	(-)	(-)	(-)	(+)
Capability	(+)	(+)	(+)	(+)
Strength	(-)	(-)	(+)	(+)
Efficiency	0	(-)	(+)	0
Weight	(+)	(+)	**(-)**	(-)
Function	0	0	(+)	(+)
Plusses	2	2	3	4
Same	2	1	0	1
Minuses	2	3	2	1
Net	0	**-1**	1	**3**
Rank	**4**	**3**	**2**	**1**
Continues	NO	NO	NO	YES

Table 3.6: Pugh concept

3.2.4 Product Design Specification

After select the selection concept, it shows that concept D is the best concept and must be fabricated. The product design specification is like below:

1. Frame

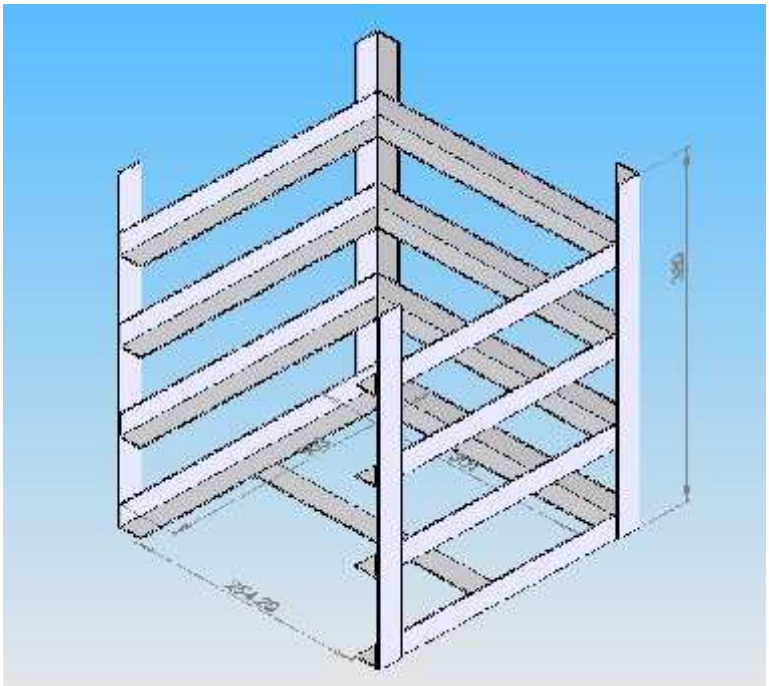
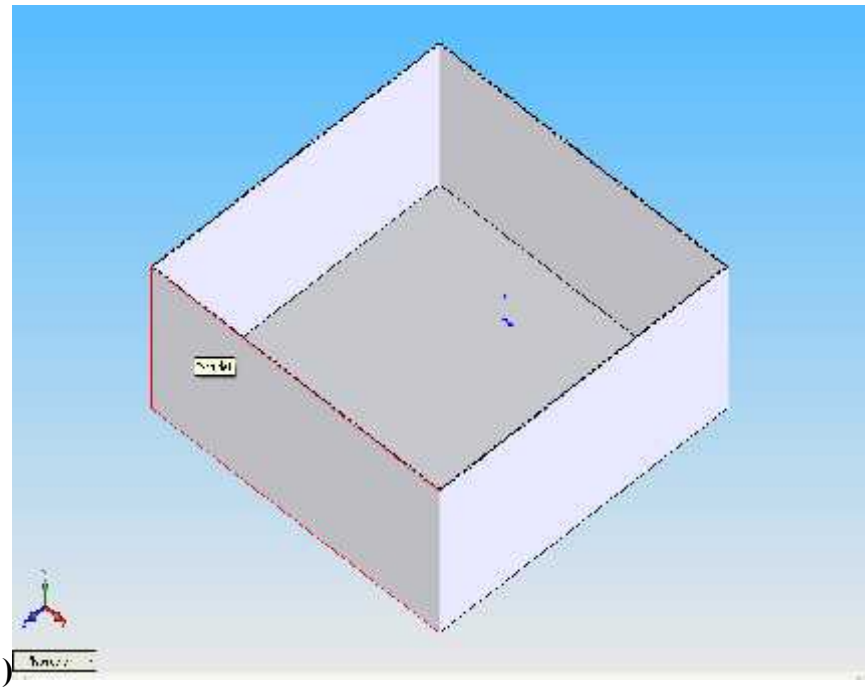


Figure 3.7: Frame

- The material MILDSTEEL L bar
- Using arc welding and MIG welding to fabricate the chassis

2. **Drawer (container)**



3.)

Figure 3.8: Drawer (container)

- The material for this part is
- The dimension is 304.8mm x 89mm (3pieces)
- Using bending machine and MIG welding fabricate this part

4. **Free joint**

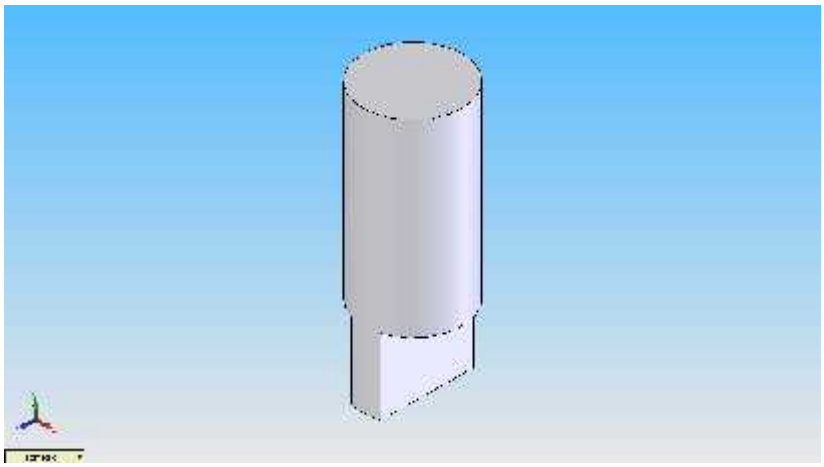


Figure 3.9 ;Upper Joint

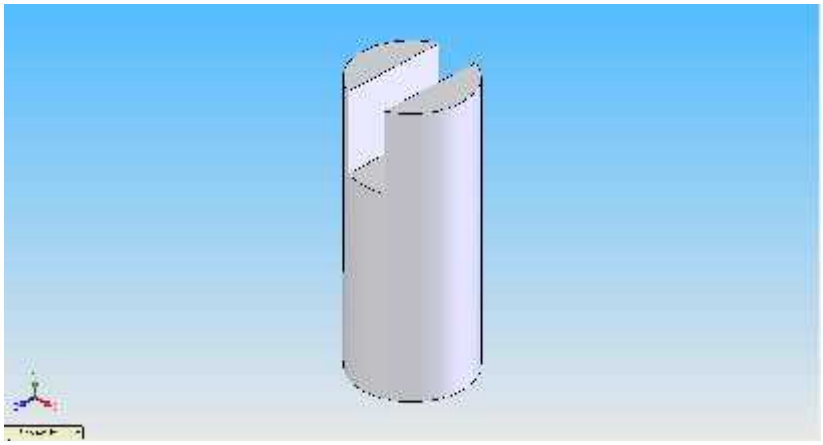


Figure 3.9: Lower Joint

- Using rod bars iron 0.5 x 0.5 inches
- Using Metal inert gas (MIG) welding to fabricate the racks

5. Floor

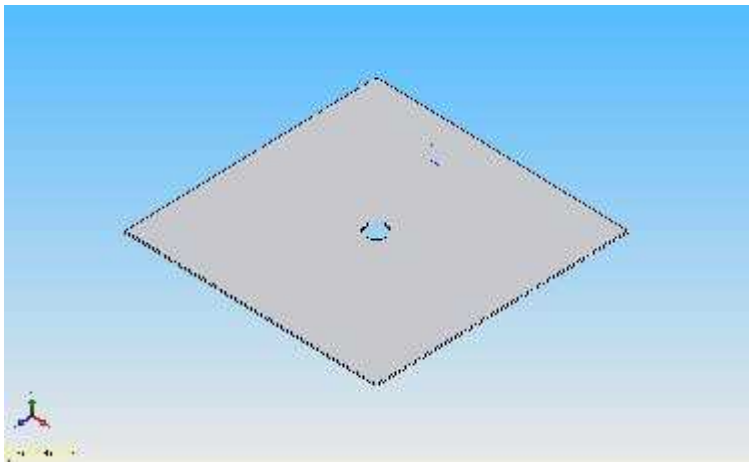


Figure 3.10: Floor

- The material for this part is mild steel sheet 308.8mm x 308.8mm
- Using sheering process to make this part

6. Gear

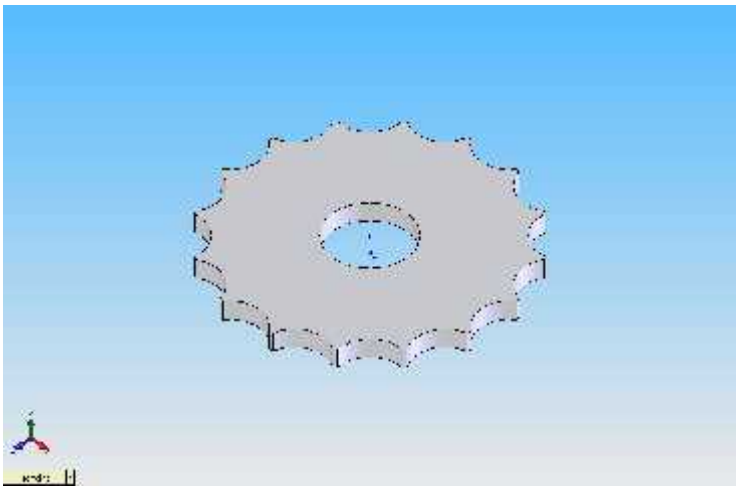


Figure 3.11: Gear

- The dimension is 75mm Radius (1 piece)
- 20mm radius (1 piece)

3.3.5 Engineering Drawing of The Sieve Machine

After a design has been selected, the next step in the designing the process is dimensioning. The design is separated into part by part and the dimensioning process is firstly sketched on paper.

After dimensioning, the engineering drawing of the design is drawn using Solid work software. At this stage solid modeling method is used. Part by part solid modeling created according to the dimension done before after all part created; the 3D model is assembled with each other based on design. All part is converted to orthographic view to get its engineering drawing detail after assembly process is done.

7. Frame

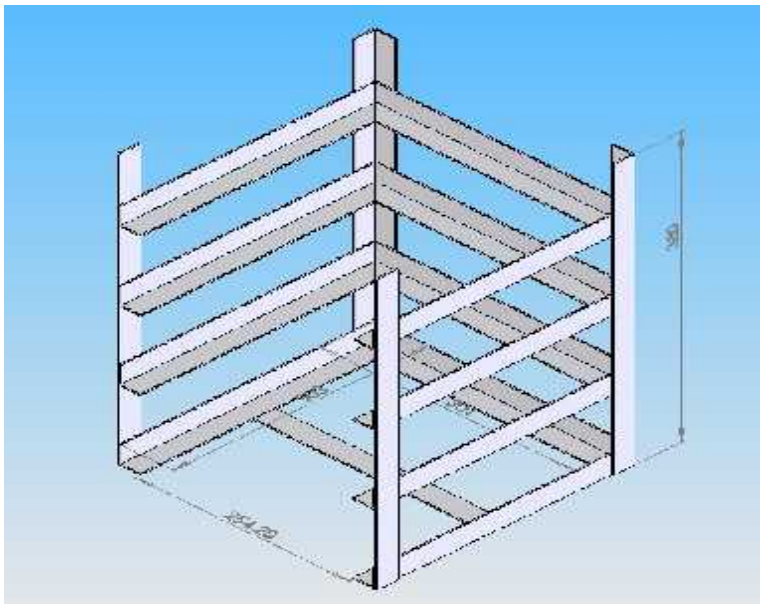


Figure 3.5.1; Frame

8. Drawer (container)

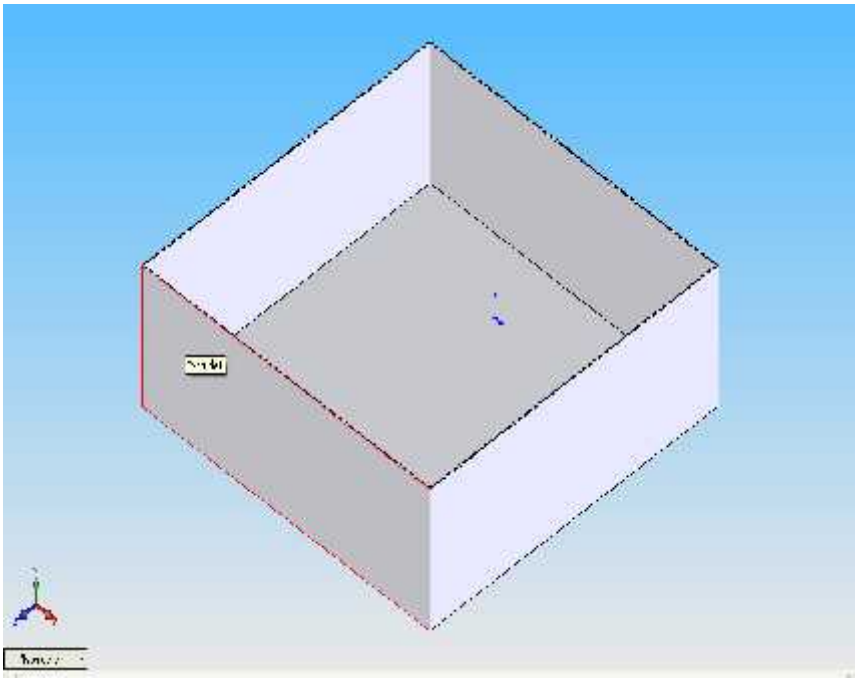


Figure 11; Drawer (container)

9. Floor

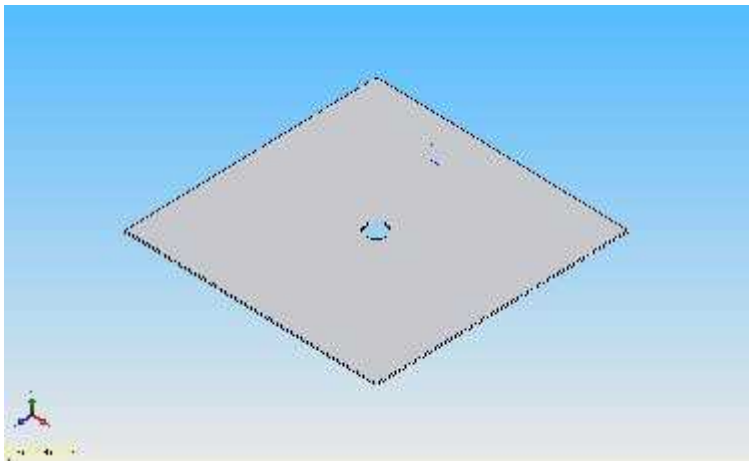


Figure 12; Floor

10. Gear

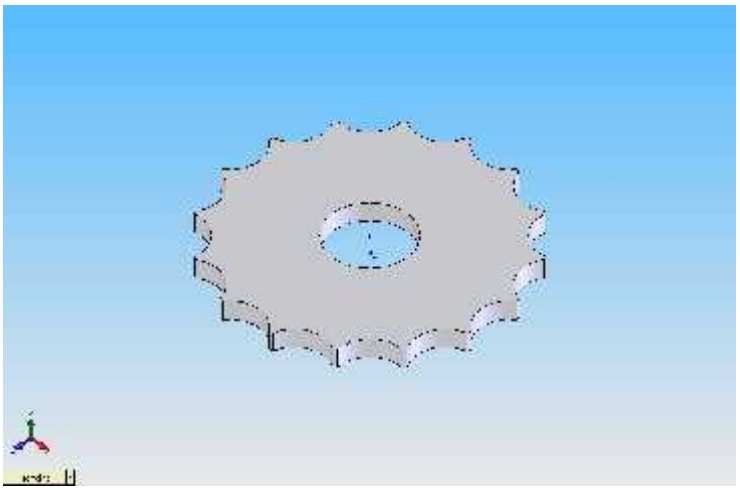


Figure 13; Gear

11. Handle

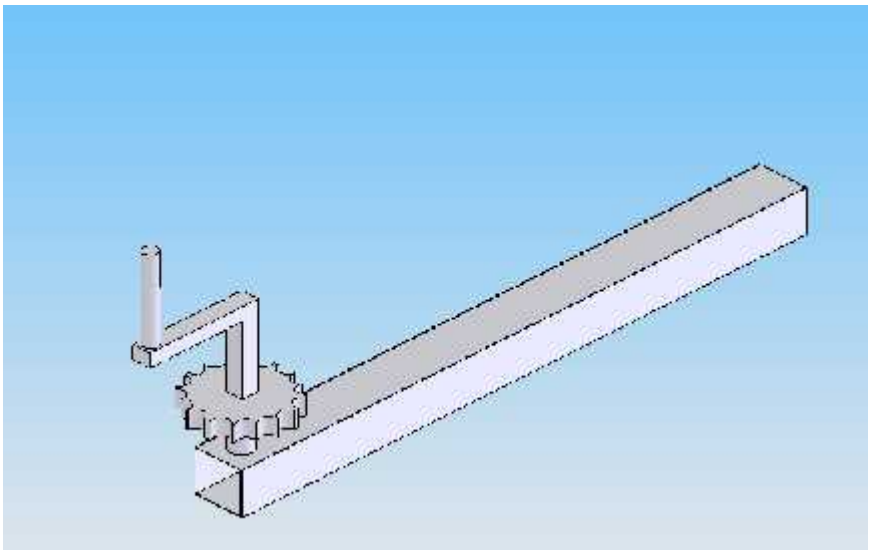


Figure 14; Handle

Full Assembly

Full assembly sieve machine (before modification)

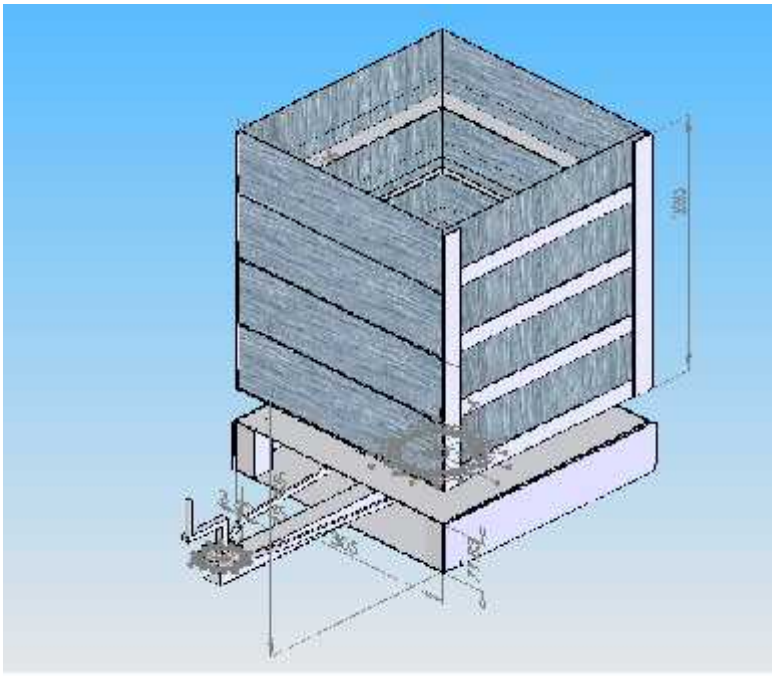


Figure 3.15: Assembly Part

3.3.6 Processes Involves

In order to make the design come reality, fabrication process needs to be done first .The fabrication process start from dimensioning the raw material until it is finish as a desire product .The processes that involve are:

i) Getting material

Figure 3.16 introduces the material have in UMP mechanical laboratory .This rack have more type of steel like rectangular hollow, hollow cylinder and etc.

Figure 3.16: Raw material

ii. Measuring and Marking

After get the material, next step is measuring and making material like Figure 3.17. The equipment used in this process is measuring tape and marker pen. The scale is from solid works software and this scale is the true.

Figure 3.17: Marking and measuring process

iii. Cutting process

Figure 3.18 introduce the process cutting the material using floor cutter disc after measurement and making process.

Figure 18; Cutting

IV. Joining Process

Figure 3.19 introduce about joining method using MIG welding .This process is used to joining the frame part.

Figure 3.19: Joining process by using MIG weld

v. Drilling process

Figure show about drilling process to make the hole for the floor The tool of drill must be applicable with the size of rod bar

Figure 3.20: Drilling process

vi. Grinding process

After cutting and welding process the chip from work piece must remove using hand grinding show in figure 3.21 to remove chip after process cutting and remove bead after welding process on the work piece and get smooth surface before joining and after joining process. This step must take to protect from dangerous because the chip is very sharp.

Figure 3.21: Grinding process

viii. Finishing process (painting)

After grinding process, the finishing process is taken place. The purpose of painting is to make the product be more interesting.

Figure 3.23: Painting process

3.3.8 Summary

This chapter has been discussed generally about project methodology, how to manage flow work and process involve. Throughout this project have learned how to design start with sketching, design concept, concept selection and drawing until fabricate and assemble structure with step by step .This project can be developed the skill to manage the machine such as lathe machine, drill, hand grinding, cutter and welding.

CHAPTER 4

RESULT AND DISCUSSION

4.1 Introduction

This chapter will discuss about the completed fabrication, types of defects, product specification and cause of problem in this project. The analysis also was helped to give improvement of the sieve machine.

4.2 Results

Figure 4.1: Isometric view

Figure 4.2: Front view

Figure 4.3: side view

Figure 4.4: top view

Analysis

Cosmos

Using the advance software SOLIDWORKS 2006 analysis have been made To calculate the strength of the material and the FOS (factor of safety). 30 N of load has been use..

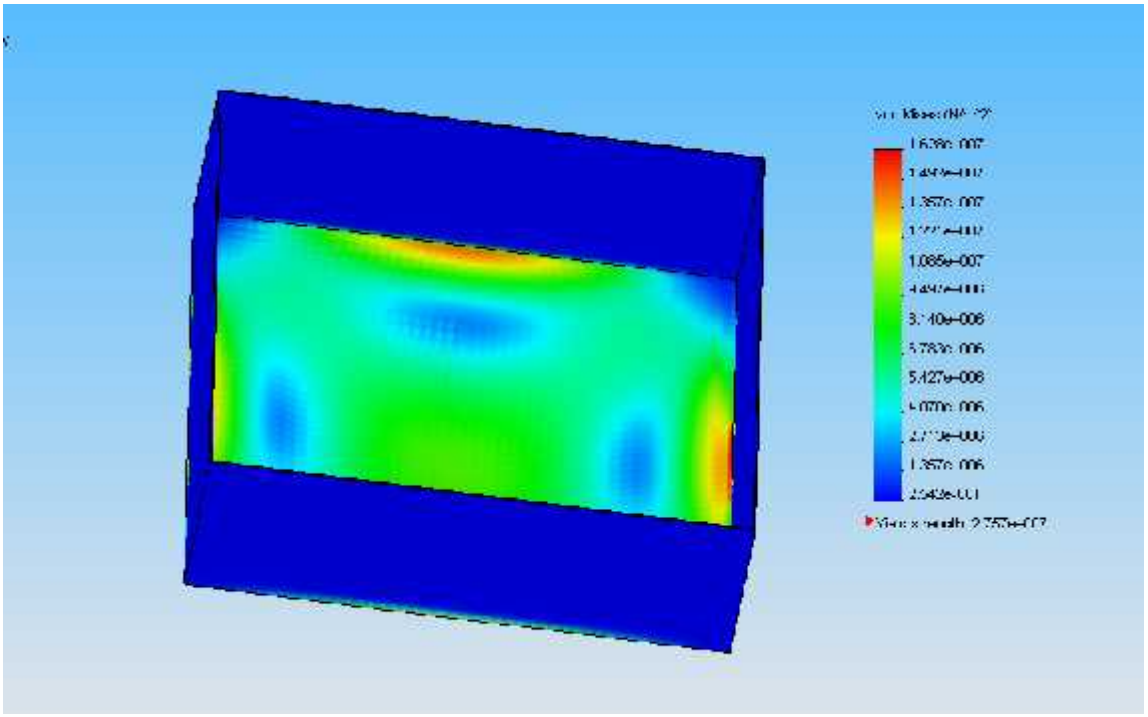


Figure 4.4; stress condition

4.2.1 Product Specification

Product specification is one of example for analysis process. There are a lot of factors that were considered.

Table 4.5: Product Specification

Category	**Result**
Type	Drawer cointaner
Wide	308.8mm x 308.8mm
Color	Silver
Height	800mm
Convenience	To handle by hand Motor power (optional)

4.3 Discussion

Discussion is diving by two parts. Firstly is discussion about type of defect on the final product .Second, is about the problem in progress start with literature review until fabricate and finish this product.

4.3.1 Type of Defect

There are so many things that happen in fabrication process such as a defect. It happened because lack of skills to operate using several machine and tools from fabrication process. Here were some of defects happen during conducting the project.

i. Not parallel

This defect happen cause by less skill when process weld the Chasis of the sieve machine . This defect at ground leg. When the L bar is not place at the flat surface during weld the leg.

ii. Bead

Figure 4.7 is example a defect on sieve machine drawer .The bead is not trim from welding process. The voltage when welding process is not suitable for this material. Insufficient experience to handle also caused of the defected.

Figure 4.7: Bead at the join

iii. Gap

Figure 4.8 is shown a defect in part .It is occurring after using arc welding.

Figure 4.8: Gap between two materials.

4.3.2 Problem

Many problems occur in progress to design and fabrication of this table such as gather raw data and literature review, design and fabrication. The problem in progress just like below.

i. Design Problem

The problem also occurs at this step. The problem came during decision making to design that suitable with available machine in UMP mechanical lab .During this period many concept design have been find out when to choose one design that have all criteria needed by specification is can proceed and running machine such as punching machine .After a design is selected , another problem encountered is detail dimensioning, the dimension should suitable with scope of the project and after consider all part and material use the dimensional was suitable with project scope. Another

problem encountered during design process is material selection, this problem as like which there are suitable material with design and how to fabricate it.

ii. Fabrication Problem

Problem during this stage is very critical that make the actual progress not follow project planning schedule. First , the problem is to find material that suitable for the title of the project .The suggestion material to produce the sieve machine drawer (container) is not available such as stainless steel was finish .After consider all problem about material available design for the project was change follow material available The problem also come during fabrication process ,mainly is hard to fabricate the material with the design was change in order to be easy in machining process such as about used bend saw machine. This project fabrication have problem when to welding part of

CHAPTER 5

CONCLUSION AND RECOMMENDATION

5.0 Introduction

For the final chapter it present about conclusion and recommendation for the project. The important things for this chapter are about the problems encountered during the whole project carried out. The problem are included the process planning that have been done. These project problems also make the student to think more creative to solve the problem. This chapter also discuss about the conclusion of the project that is concluding all the process involved. Beside that, this chapter also contains recommendation about project. This is very important to make some improvement about the project for future work.

5.1 Summary of Project

5.1.1 Designing Process

In the design process, from the knowledge gathered from the review is use to make a sketch design the suitable for the project. After several design sketched, design consideration have been made and one design have been chosen. The selected design sketched is then transferred to solid modeling using Solid works program.

5.1.2 Fabrication Process

The final drawing and sketching is used as a reference by following the measurement and the type of materials needed. The fabrication process that involved is cutting, welding, drilling and others. After every process was finished, the parts are checked to make sure that the output of the process obeys the product requirement.

5.1.3 Assembly Process

If all the parts had been processed, the parts are joined together to produce full sieve machine. The body of sieve machine will be combined with drawer, handle by hand to rotate it..

5.2 Conclusion

For the conclusion the project has achieves their objectives. The project sieve machine was successfully design. It is suitable to use at the lab or construction side . Besides that this sieve machine is also easy to carry. It can be use most suitably for small work of process and the product can not easy to be occur. The product is very light and it can be portable. This sieve machine also provide better ergonomic factor for the comfortable situation when using it. It also was introduced new concept of the sieve machine that suitable with costumer specification.

5.3 Recommendation

Precise planning of the work progress will make sure that the project can be done in a shorter time. Having a good time management can guaranty that any of student tasks to complete in a good ways and also give more time to focus on other subject. But several recommendations to improvement for me and faculty for future final year project are still need.At the last all machines and equipments at FKM LAB always should be in good condition. This situation can help student to complete their project on time. And anyone can refer to this thesis to improve or to use it as reference

REFERENCE

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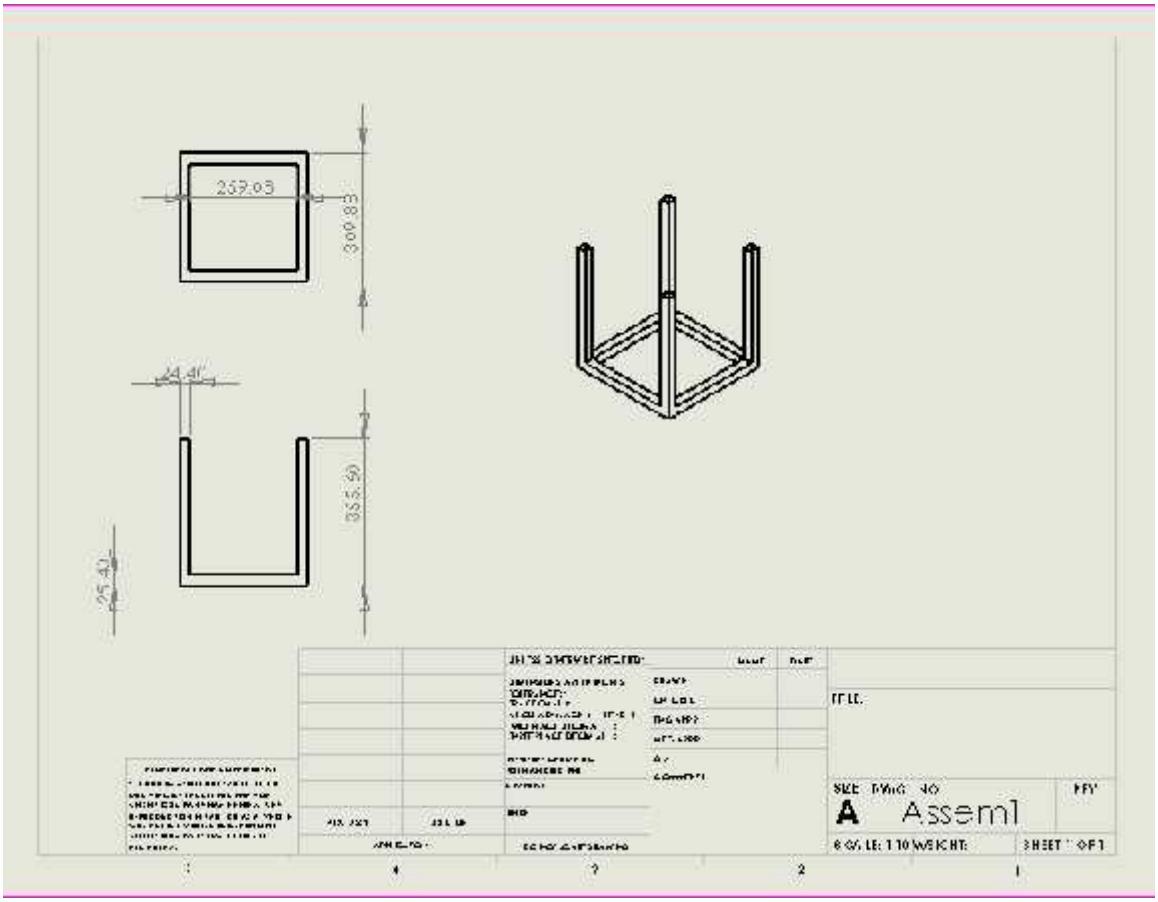
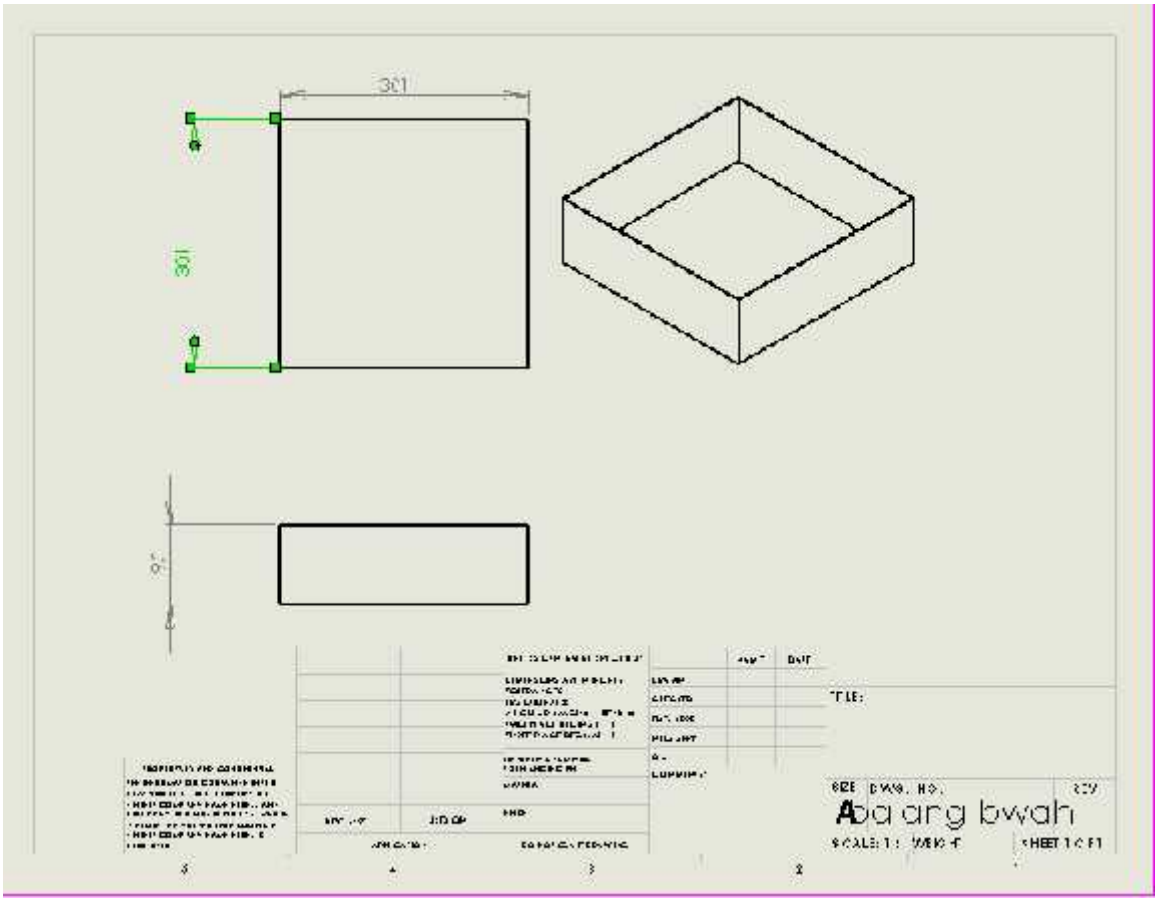
Appendix A

Frame Drawing



Appendix B

Drawer Container Drawing



Appendix C

Complete Assembly Drawing