CAN OPENER

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Report submitted in partial fulfilment of the requirements
For the award of the degree of
Diploma of Mechanical Engineering

Faculty of Mechanical Engineering
UNIVERSITI MALAYSIA PAHANG

23 NOVEMBER 2009

SUPERVISOR'S DECLARATION

"I hereby declare that I have checked this project report and in my opinion this project is satisfactory in terms of scope and quality for the award of the degree of Diploma of Mechanical Engineering"

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Date : 23 NOVEMBER 2009

STUDENT'S DECLARATION

I declare that the work in this report is my own except for quotations and summaries which have been duly acknowledged. The report has not been accepted for any diploma and is not concurrently submitted for the award of the degree of Diploma of Mechanical Engineering.

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ACKNOWLEDGEMENT

I am grateful and would like to express my sincere gratitude to my supervisor Mr. Ngui Wai Keng for his germinal ideas, invaluable guidance, continuous encouragement and constant support in making this report. I appreciate his consistent support from the first day I applied to graduate program to these concluding moments. I am truly grateful for his progressive vision about my training in science, his tolerance of my naive mistakes, and his commitment to my future career.

My sincere thanks go to all my lab mates and members of the staff of the Mechanical Engineering Department, UMP, who helped me in many ways and made my stay at UMP pleasant and unforgettable. Many special thanks go to member engine research group for their excellent co-operation, inspirations and supports during this study.

I acknowledge my sincere indebtedness and gratitude to my parents for their love, dream and sacrifice throughout my life. I cannot find the appropriate words that could properly describe my appreciation for their devotion, support and faith in my ability to attain my goals. Special thanks should be given to my committee members. I would like to acknowledge their comments and suggestions, which was crucial for the successful completion of this study.

ABSTRACT

This report will present about the can opener. The can opener is a device that will use to open the metal can especially for the sardine can, food can and also milk can. Most cans have identical and parallel round tops and bottoms with vertical sides. The idea of fabricate of this can opener based on student creativity. This can opener will be fabricating with have the frame body that will combine with clamper to clamp the tin can. In the fabrication, there are many process involve to develop the product such as drilling, grinding, joining, measuring, gathering material, cutting material, and finishing process. This project is about design and fabricates a new product of can opener that has safety to user and more stable when it cut the metal can. Material are be used to fabrication of the can opener is a mild steel and stainless steel. In this report also that will more focus about the fabrication of this can opener.

ABSTRAK

Laporan ini membentangkan tentang pembuka tin. Pembuka tin ialah satu alat yang digunakan untuk membuka besi tin khususnya untuk tin sardine, tin makanan dan juga tin susu. Kebanyakan tin mempunyai permukaan bulat yang selari di permukaan atas dan juga dipermukaan bawah dengan sebelah tepi yang tegak.Idea pembentukan pembuka tin ini berdasarkan kreativiti pelajar sendiri. Pembuka tin ini akan dibentuk dengan mempunyai rangka badan yang digabungkan dengan pemegang untuk memegang tin. Dalam pembentukan pembuka tin ini, terdapat banyak process yang dilakukan seperti gerudi, megisar, menyambung, mengukur, mengumpul bahan, memotong bahan dan mencantikan produk. Project ini bertujuan untuk menghasilkan pembuka tin yang baru yang selamat digunakan oleh pengguna dan mempunyai kestabilan semasa ingin memotong besi tin. Bahan yang digunakan untuk membentuk pembuka tin ini ialah jenis “mild steel” dan juga jenis “stainless steel”. Dalam laporan ini juga akan lebih memfokuskan tentang pembentukan pembuka tin ini.

TABLE OF CONTENTS

LIST OF TABLES

LIST OF FIGURES

LIST OF SYMBOLS

σ	Yield Strength ( )
	Area of hollow steel ( )
	Pressure that applied on the hollow steel (*N*)
m	Mass (*kg*)
	Concentrated force (*N*)
m	Distance (m)
N	Newton

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LIST OF ABBREVIATIONS

MIG	Metal Inert Gas Welding
PPE	Personal Protective Equipment
SMAW	Shielded metal arc welding
OXY	Oxyacetylene
GMAW	Gas Metal Arc Welding
DC	Direct Current
EP	Electrode Positive

CHAPTER 1

INTRODUCTION

The project involves designing and fabricating a Can Opener. A can opener (also known as a tin opener) is a device used to open metal cans. Basically the can opener could be divided into three stages, which are concept safety, designing and fabrication.

The can opener is equipped by using material which include, rectangular plate steel, round hollow steel, and rectangular hollow steel in manufacturing process by perform MIG welding to joint the parts and etc. The advantages of the proposed can opener to be developed can be seen to be open the metal can such as food can and milk can.

1.1 PROBLEM STATEMENT

As we know many type of can opener already have in the market and it almost have in one-handed product. However certain of product not safety for user especially about the blade and puncher. It is unsafe because the blade and puncher freely exposed to open the food or milk can in safety condition and also for convenience.

1.2 PROJECT SCOPE OF WORK

i. Sketching and designing can opener using Solidwork software.
ii. Fabricate and produce the can opener by using all necessary manufacturing process such as welding, cutting, grinding and etc.

1.3 PROJECT OBJECTIVES

The project objectives are to design and to fabricate a can opener:

i. That is suite to its application especially for open metal can.
ii. More safety for user.

1.4 ORGANIZATION OF THE THESIS

This thesis consists of five chapters that will explain each of part of the project. Chapter one will briefly explain about the objective of project, problem statement, and scope of this project.

Chapter two will explains about the can opener, type of can opener, tin can, and material of tin can and fabrication of tin can. Chapter three is the methodology of developing the application, it also details about the design of product, bill of material and all fabrication process.

Chapter four will explain about the analysis product such as cost analysis and stress analysis and for the chapter five or also the last chapter in this thesis will cover about the conclusion of the project and will also carry out the recommendation to improve the product in the future.

1.5 CONCLUSION

As a conclusion, objective and the scope already clear to develop the project base the problem statement and can continue to go for the next step on this project.

CHAPTER 2

LITERATURE REVIEW

The can opener is a mechanism that allowed people to open the metal can to take the something inside the tin such as milk can, food can and sardine can. It's help man to make easy to open the metal can without get the injury and it is more safety than using the knife or something like screw driver. It is design as kitchen utensils and only suitable to open the metal can.

2.1 CAN OPENER

A can opener also known as a tin opener is a device used to open metal cans. Although preservation of food using tin cans had been practiced since at least 1772 in the Netherlands, the first can opener was patented only in 1855 in England and in 1858 in United States. Those openers were basically variations of a knife and the 1855 design is still being produced. The first opener employing a now familiar sharp rotating wheel which runs around the can's rim cutting the lid was invented in 1870 but was difficult to operate. A breakthrough came in 1925 when a second serrated wheel was added to hold the cutting wheel on the rim. This easy to use design has become one of the most popular can opener models.

Around the time World War II several can openers were developed for military use such as P-38 and P-51. That opener featured robust and simple design where a folding knife and absence of a handle significantly reduced the opener size. Electric can openers were introduced in the late 1950s and were met with success. The development of the new can opener types continues nowadays with a recent example being a side cutting model.

2.2 TYPE OF CAN OPENER

2.2.1 Lever type Can Opener

Dedicated can openers appeared only in the 1850 and they were of primitive claw-shaped or lever-type design shown in the figure 2.1. Robert Yates, a cutler and surgical instrument maker of Trafalgar Place West, Hackney Road had patented the first can opener on 13 July 1855. His cutter incorporated a lever knife for cutting or ripping open preserved provision cases and other uses. It has a familiar construction with a curved blade and a projection with shoulders forming and efficient bearing or fulcrum in use. This robust design survived until present day.

In 1858, another lever type opener of more complex shape has been patented in US by Ezra Warner of Waterbury. It consisted of a sharp sickle which was pushed into the can and sawed its lid around the edge. A guard kept the sickle from penetrating too far into the can. The opener consisted of several parts which could be replaced if worn out, especially the sickle.

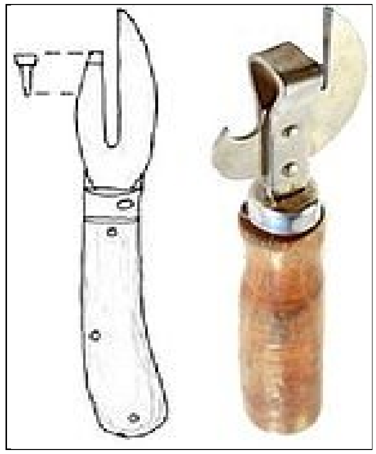


Figure 2.1: lever type can opener design of 1855 by Robert Yates

Source: Wikipedia, the free encyclopedia (2009)

2.2.2 Rotating Wheel Opener

The first rotating wheel can opener shown in the figure 2.2 was patented in July 1870 by William Lyman and produced by the firm Baumgarten in the 1890. The can was to be pierced in its canter with the sharp metal rod of the opener. Then the length of the lever had to be adjusted to fit the can size and the lever fixed with the wingnut. Thetop of the can was cut by pressing the cutting wheel into the can near the edge and rotating it along the can's rim.

The necessity to pierce the can first was nuisance, and this can opener design has not survived till present day. In 1925, the Star Can Opener Company had improved the Lyman's design by adding a second toothed wheel called "feed wheel" which allowed a firm grip of the can edge. This addition was so efficient that the design has been adopted until present day.

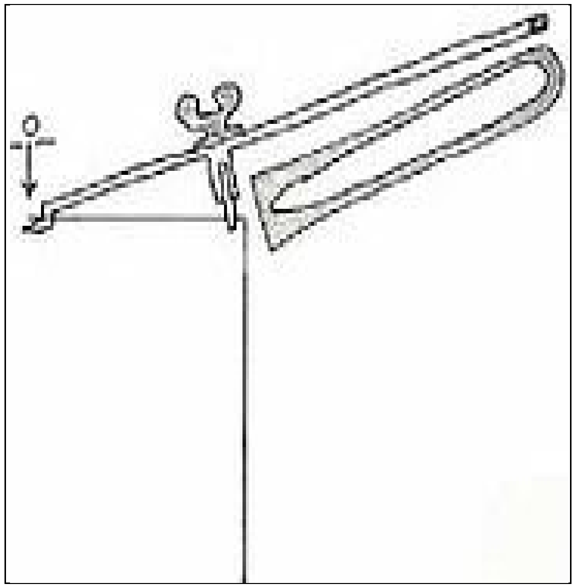


Figure 2.2: The rotary can opener of 1870 by William Layman

Source: Wikipedia, the free encyclopedia (2009)

2.2.3 Church Key

Initially referred to a simple hand-operated device for prying the cap of glass bottle. This kind of closure was invented in 1892 so as the Church key. The shape and design of some of these openers did resemble a large simple key. In 1935, beer can with flat tops were marketed and a device to puncture the lids was needed. The same church key opener was used to piercing those can. It was made from a single piece of pressed metal with a pointed end used for that depicted operating instruction on the cans themselves. The church key opener is still being produced usually as an attachment to another opener for example a “butterfly” opener is often a combination of the church key and a serrated-wheel opener.

Figure 2.3: A modern butterfly opener which combines a serrated wheel and a church key.

Source: Wikipedia, the free encyclopedia (2009)

2.2.4 Military can opener

Can opener with a simple design shown in the figure 2.4 and robust design had been specifically developed for military use. The P-38 and P-51 are small can opener with a cutter hinged to the main body. Also known as John Wayne because the actor was shown in a training film opening a can of K-rations. The P-38 can opener is keychain sized about 1.5 inches, 38 mm in length and consist of a short metal blade that serves as a handle and can also be used a screwdriver with a small, higher metal tooth that folds out to pierce the can lid. A notch just under the hinge points keeps the opener hooked around the rim of the can as the device is walked around to cut the lid out. A larger version called P-51 is somewhat easier to operate. P-38 was developed in 1942 and was issued in the canned field rations of the United States Armed Forces.

The P-38 and P-51 are cheaper to manufacture and are smaller and lighter to carry than most other can openers. The device can be easily attached to a key ring or dog tag chain using the small punched hole.

Figure 2.4: P-51 and P-38 Military can opener

Source: Wikipedia, the free encyclopedia (2009)

2.2.5 Electric can opener

The first electric can opener shown in the figure 2.5 was patented in 1931 and modelled after the cutting wheel design. Those opener have been produced in1930 and advertised as capable to remove lids from more than 20 can per minute without any risk injury. Nevertheless they found little success. Electric openers were re-introduced in 1956 by two Californian companies. Klassen Enterprises of Centreville brought out a wall-mounted electric model however this complex design was unpopular too.

The same year, Walter Hess Bodle invented a freestanding device combining an electric can opener and knife sharpener. He and his family members built their prototype in his garage with daughter Elizabeth sculpting the body design. It was manufactured under the Udico brand of the Union Die Casting Co. In Los Angeles and came in the flamingo pink, avocado green and aqua blue colours of the era. These openers were introduced on the market for Cristmas sales and had immediate success.

Figure 2.5: Electrical Can Opener

Source: Wikipedia, the free encyclopedia (2009)

2.2.6 Modern design Can Opener

A new style shown in the figure 2.6 of can opener emerged in 1997. Whereas most other openers cut the can from the top, this one cuts the can from the side, very near its top. The rim is neatly cut in half in the plane of the flat end, leaving half of the rim attached to the can and the other half attached to the flat end. No sharp edges are produced on the lid. The driving teeth are very much finer than those of the classical can opener and reside at the bottom of a V-shaped groove, which surrounds the rim on three sides at the point of action.

Figure 2.6: Modern Design Can Opener

Source: Wikipedia, the free encyclopedia (2009)

2.3 TIN CAN

A tin can, tin, steel can, or a can, is an air-tight container for the distribution or storage of goods, composed of thin metal and requiring cutting or tearing of the metal as the means of opening. Cans hold diverse contents, but the overwhelming majority preserve food by Canning "Tin" cans are made of tinplate which is tin-coated steel. Cans are also made of aluminum or other metals. The tin can was patented in 1810 by the English inventor Peter Durand, based on experimental work by the Frenchman Nicolas Appert. He did not produce any food cans himself, but sold his patent to two other Englishmen, Bryan Donkin and John Hall, who set up a commercial canning factory, and by 1813 were producing their first canned goods for the British Army.Early cans were sealed with lead soldering, which has led to lead poisoning. Famously, in the Arctic expedition of Sir John Franklin in 1845, crew members suffered from severe lead poisoning after three years of eating canned food.

Most cans have identical and parallel round tops and bottoms with vertical sides. However, where the small volume to be contained and/or the shape of the contents suggests it, the top and bottom may be rounded-corner rectangles or ovals. Other contents may justify a can that is overall somewhat conical in shape.The fabrication of most cans results in at least one "rim", a narrow ring whose outside diameter is slightly larger than that of the rest of the can. The flat surfaces of rimmed cans are recessed from the edge of any rim (toward the middle of the can) by about the width of the rim; the inside diameter of a rim, adjacent to this recessed surface, is slightly smaller than the inside diameter of the rest of the can.

Three-piece can construction results in top and bottom "rim"; in two-piece construction, one piece is a flat top and the other a cup-shaped piece that combines the (at least roughly) cylindrical wall and the round base; the transition between the wall and base is usually somewhat gradual. Such cans have a single rim at the top.

In the mid-20th century, a few milk products were packaged in nearly rimless cans, reflecting different construction; in this case, one flat surface had a hole (for filling the nearly complete can) that was sealed after filling with a quickly solidifying drop of molten solder. Concern arose that the milk contained unsafe levels of lead leached from this solder plug.

2.4 MATERIAL OF TIN CAN

No cans currently in wide use are composed primarily or wholly of tin; that term rather reflects the near-exclusive use in cans, until the second half of the 20th century, of tinplate steel, which combined the physical strength and relatively low price of steel with the corrosion resistance of tin. Use of aluminum in cans began in the 1960s. Aluminum is less costly than tin-plated steel but offers the same resistance to corrosion in addition to greater malleability, resulting in ease of manufacture; this gave rise to the two-piece can, where all but the top of the can is simply stamped out of a single piece of aluminum, rather than laboriously constructed from two pieces of steel. Often the top is tin-plated steel and the rest of the can aluminum. A can usually has a printed paper or plastic label glued to the outside of the curved surface, indicating its contents. A label can also be printed directly onto the metal.

2.5 FABRICATION OF TIN CAN

Rimmed-can construction necessarily has three phases are joining the bottom and wall (or forming the cup-shaped piece, for a two-piece can), filling the can with content and joining the wall and top.

Rims are crucial to the joining of the wall to a top or bottom surface. An extremely tight fit between the pieces must be accomplished to prevent leakage; the process of accomplishing this radically deforms small areas of the parts. Part of the tube that forms the wall is bent, almost at its end, turning outward through 90 degrees, and then bent further, toward the middle of the tube, until it is parallel to the rest of the tube, a total bend of 180 degrees.

The outer edge of the flat piece is bent against this toward the middle of the tubular wall, until parallel with the wall, turning inward through 90 degrees. The edge of bent portion is bent further through another 90 degrees, inward now toward the axis of the tube and parallel to the main portion of the flat piece, making a total bend of 180 degrees. It is bent far enough inward that its circular edge is now slightly smaller in diameter than the edge of the tube. Bending it yet further, until it is parallel with the tube's axis, gives it a total bend of 270 degrees. Outward from the axis of the tube, the first surface is the unbent portion of the tube. Slightly further out is a narrow portion of the top, including its edge. The outward-bent portion of the tube, including its edge, is slightly further out. Furthest out is the 90-degree-bent portion of the flat surface.

Figure 2.7: Different size of tin can.

Source: Wikipedia (2009)

The combined interacting forces, as the portion of the flat surface adjacent to the interior of the tube is indented toward the middle of the tube and then outward away from the axis of the tube, and the other bent portions of the flat piece and the tube are all forced toward the axis of the tube, drives these five thicknesses of metal against each other from inside and out, forming a "dry" joint so tight that welding or solder is not needed to strengthen or seal it.

2.6 Metal Inert Gas (MIG) Welding

MIG (Metal Inert Gas) or as it even is called GMAW (Gas Metal Arc Welding) uses an aluminum alloy wire as a combined electrode and filler material. The filler metal is added continuously and welding without filler-material is therefore not possible. Since all welding parameters are controlled by the welding machine, the process is also called semi-automatic welding.

The MIG-process figure 2.8 uses a direct current power source, with the electrode positive (DC, EP). By using a positive electrode, the oxide layer is efficiently removed from the aluminum surface, which is essential for avoiding lack of fusion and oxide inclusions. The metal is transferred from the filler wire to the weld bead by magnetic forces as small droplets, spray transfer. This gives a deep penetration capability of the process and makes it possible to weld in all positions. It is important for the quality of the weld that the spray transfer is obtained.

There are two different MIG-welding processes, conventional MIG and pulsed MIG. Conventional MIG uses a constant voltage DC power source. Since the spray transfer is limited to a certain range of arc current, the conventional MIG process has a lower limit of arc current (or heat input). This also limits the application of conventional MIG to weld material thicknesses above 4 mm. Below 6 mm it is recommended that backing is used to control the weld bead.

Pulsed MIG uses a DC power source with superimposed periodic pulses of high current. During the low current level the arc is maintained without metal transfer. During the high current pulses the metal is transferred in the spray mode. In this way pulsed MIG is possible to operate with lower average current and heat input compared to conventional MIG. This makes it possible to weld thinner sections and weld much easily in difficult welding positions.

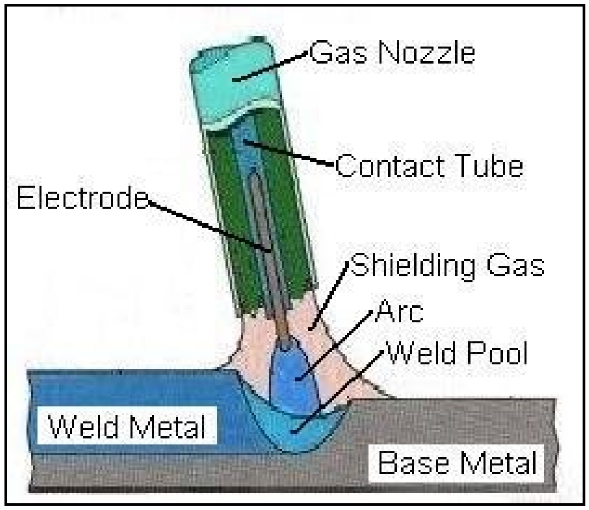


Figure 2.8: Schematic of Metal Inert Gas (MIG) Welding

Source: Wikipedia (2009)

GMAW is frequently referred to as MIG welding. MIG welding is a commonly used high deposition rate welding process. Wire is continuously fed from a spool. MIG welding is therefore referred to as a semiautomatic welding process.

There are some advantages and disadvantages in using MIG welding the advantages of MIG welding, all position capability and have higher deposition rates than SMAW. Than less operator skill required, long welds can be made without starts and stops and minimal post weld cleaning is required. However MIG welding also have the disadvantage such as costs money of consumable, such as tips and nozzles. Furthermore, it is not worth a dang on paint, rust, or dirty surfaces and also no good for thick steel because it does not get the proper penetration.

2.7 Drill Press

A typical manual drill press is shown in the figure 2.11. Compared to other powered metal cutting tools, a drill press is fairly simple, but it has evolved into a versatile necessity for every machine shop.

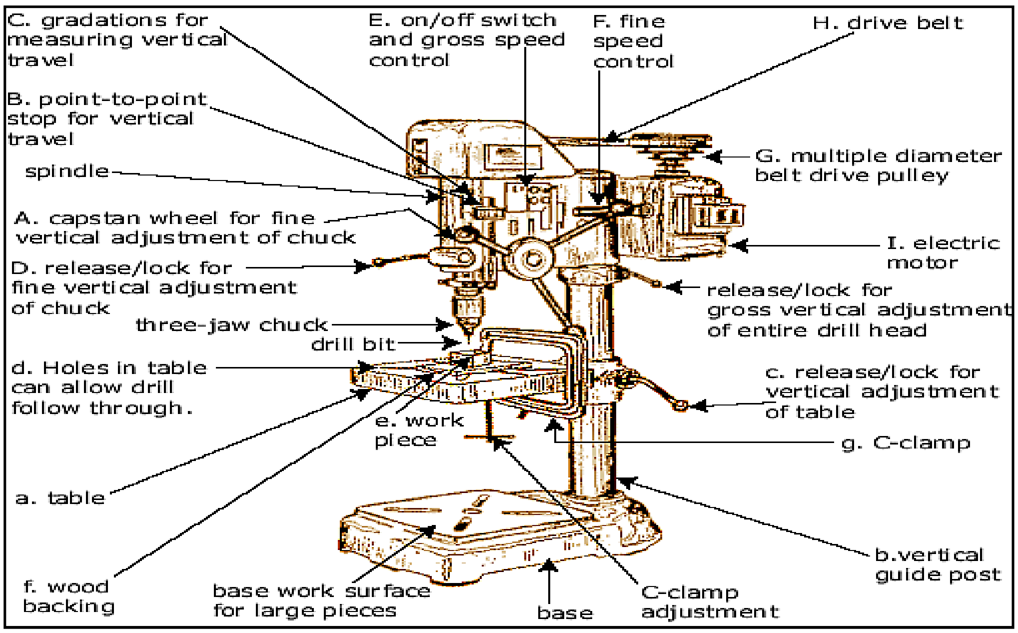


Figure 2.9: Drill Press Machine

Source: DrillMachine. Com (2009)

2.8 GRINDING

Grinding shown in the figure 2.10 is a finishing process used to improve surface finish, abrade hard materials, and tighten the tolerance on flat and cylindrical surfaces by removing a small amount of material. Information in this section is organized according to the subcategory links in the menu bar to the left.

In grinding, an abrasive material rubs against the metal part and removes tiny pieces of material. The abrasive material is typically on the surface of a wheel or belt and abrades material in a way similar to sanding. On a microscopic scale, the chip formation in grinding is the same as that found in other machining processes. The abrasive action of grinding generates excessive heat so that flooding of the cutting area with fluid is necessary.

Figure 2.10: Grinder

CHAPTER 3

METHODOLOGY

Project methodology is a body of practices, procedures and rules used by those who work in a discipline or engage in an inquiry and a set of working methods. In this chapter, it will explain about the process that involved during the fabrication process. I also will explain about the design and analysis that had been chosen to be as the final idea to be producing or fabricate. All the fabrication process in this project is going to be explained in details.

3.1 PROJECT FLOW CHART

Flow chart show in appendix C, the project starts identifies the problem. This is a first step for the project flow because it wants to know about the problem that still have in current product and this step can help me to create a different type of the product.

After identify the problem for the project, continue with identify the scope of the project because this scope can help to make of the product in this project. First of all, the first scope for this project is a literature review. This scope it is important to gathered data about can opener in entire aspect like type, material and shape. For the next scope is a sketch and design. This scope is purpose to sketch the product before it can be fabricate. Then it will fabricate the product following the drawing or sketching. For final is a testing and evolution.

Next, after identify the scope continue with find the main objective for this project design. The objective is very important in every work or to make a project. It will help the person know the main point to make it success for there project or work. So, the main of objective for my project is to make the cab opener that can be more safety to the user and more stable in cutting metal can process.

After choose the best objective for the project, continue with literature review and research about the title. This consist a review of the concept of can opener, system can opener, can opener features and type of can opener. These task have been done through research on the internet, books and others sources.

After all the parts needed had been gathered, the project proceeds to next step that is fabrication process. The finished 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, and others. If all the parts had been processed, the parts are joined together to produce full-scaled can opener.

Here come the testing and evaluation process. The can opener will be test to see if it full fills the requirement such as ergonomic aspect, safety, and strength. During the testing, if problem occur, the can opener will step back to the previous process, where the error is fixed. The can opener is expected to have an error that may cause the part to be re-designed and re-fabricate again.

After all the parts had been joined together, here comes the last phase of process that is data discussion. In data discussion, the draft report and all the related articles are gathered and hand over to the supervisor for error checking. The finish product will be compared with the report to make sure that there is no mistake on both project and report.

After the product and the report had been approved by the supervisor, the report is rearrange and print out to submit at the supervisor, the project coordinator and faculty of Mechanical Engineering. In this stage, the final presentation was also being prepared and waited to be present.

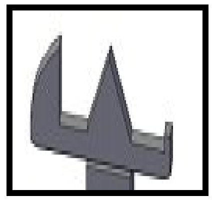
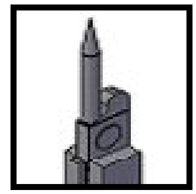
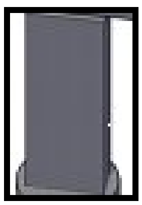
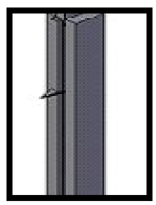
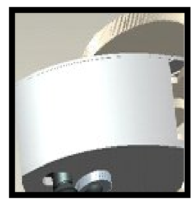
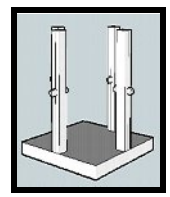
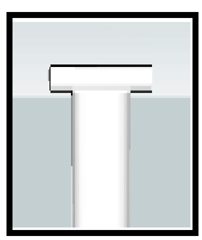
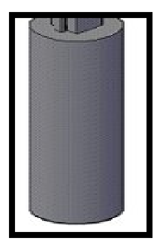
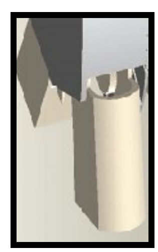
3.2 CONCEPT GENERATION

3.2.1 Concept Generation Process

Concept generation is a concept that we can make to design our product. It will compare with different idea to create a new concept.

The concept generation will be dividing in three parts such as header or blade of product, body of product and holder. Table 3.1 show a concept generation.

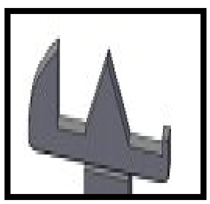
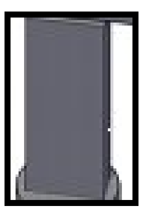
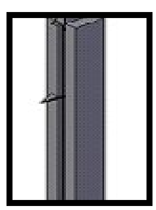
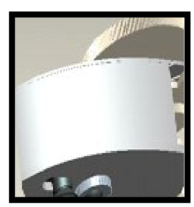
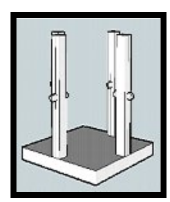
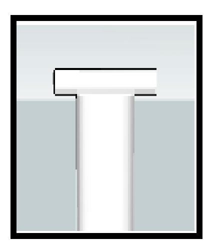
Table 3.1: Concept Generation

	1	2	3	4
Header / blade				
body				
holder				

3.2.2 Concept Combination

After the concept generation process, the concept will continue to combine the part that already generates to get one concept. Table 3:2 show the concept combination process.

Table 3.2: Concept Combination

	Concept A	**Concept B**	**Concept C**	**Concept D**
Header / blade				
body				
holder				

This concept it combines with A2, B1, and C1. From the concept A the design is using static header and the blade cannot be adjust. Beside that the blade and the puncher was combine together. This product was using a plastic holder.

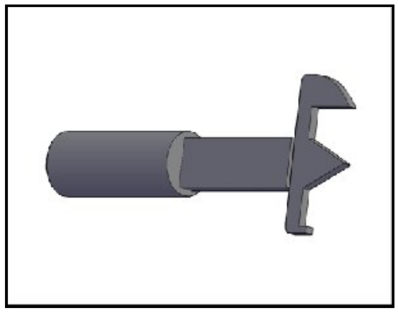


Figure 3.1: Concept A

For this concept it combines with A4, B2 and C3. For concept B, this design using a puncher that can be fold. Than this design was using a adjustable blade. The holder for this design made it from metal.

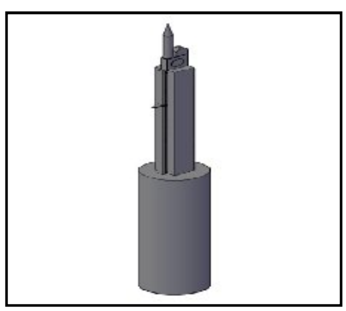


Figure 3.2: Concept B

This concept it combines with A1, B3 and C4. For the concept C, the body was made it from plastic part. This product can be function using electric source. Beside that this design use the gear to move the cutting blade and to clamp the can, it is use a twister to clamp the can between can and blade.

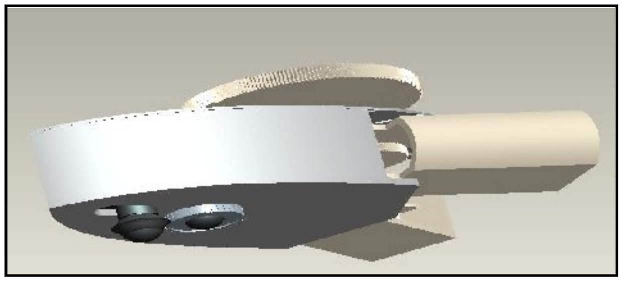


Figure 3.3: Concept C

For this concept it combines with A3, B4 and C2. The body was made it from steel. These concepts also use the adjustable blade like a concept B and use a twister holder to move the cutting blade. Beside that these concepts have a clamper to clamp the can from moving when in cutting process.

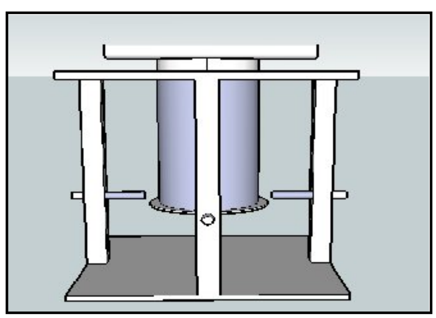


Figure 3.4: Concept D

3.2.3 Concept Selection

In concept selection, the all part needs to combine using comparison with all criteria to get the best concept. The best concept will be select as a product to fabricate in this project. Table 3.3 show the concept of selection criteria.

Table 3.3: Concept Selection Criteria

selection/criteria	Concept A	B	C	D
Durability	–	0	–	+
Strength	+	0	–	+
Manufacturing cost	+	0	–	–
safety	–	0	–	+
Easy to use	–	0	+	+
easy to store it	0	0	0	–
+ pluses	2	0	1	4
o same	1	0	1	0
– minus	3	0	4	2
net	-1	0	-3	2
rank	3	2	4	1
continue	no	no	no	yes

Studies of the concept selection criteria at table 3.3 show that concept D get the highest positive sign. So, as a result, concept D is the best concept to be produce.

3.3 FINAL CONCEPT

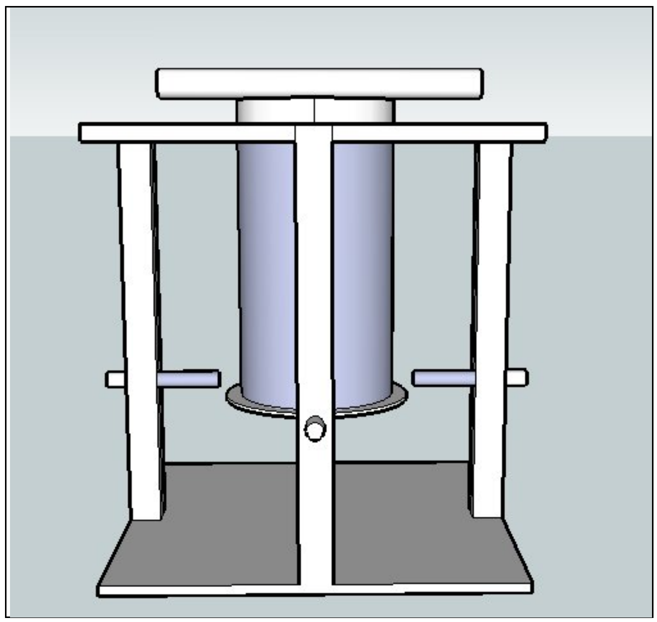


Figure 3.5: Final Concept Design

This design show that the final idea of the Can Opener. Additional base for body frame and clamper also were added to make sure that the can opener more safety and more stability in cutting process.

3.4 BILL OF MATERIAL

In this project, materials that will use are so many type and also have a different shape. So Bill of Material (also call BOM) is atable that will explain more detail about material selection. Table 3.4 show a bill of material.

Table 3.4: Bill of Material

BIL	TYPE	SIZE (mm)	QUANTITY
1	Hollow Steel	20x20x250	4
2	Plate	4x250x250	1
3	Round Hollow Steel	D75x200	1
4	Round Hollow Steel	D20x20	1
5	Plate	1x250x250	1

3.5 FABRICATION PROCESS

After designing phase, comes fabrication process. These processes is about using the material Selection and make the product base on the design and by followed the design dimension. Many methods can be used to fabricate a product, like welding, fastening, cutting, drilling and many more method. Fabrication process is difference from manufacturing process in term of production quantity. Fabrication process is a process to make only one product rather then manufacturing process that focus to large scale production. In the project fabrication process needed to make the base plate, framework of display board and display board. Fabrication process was used at the whole system production. This was include part by part fabrication until assembly to others component.

The fabrication process was started with measuring the material into the required dimension. 20mm x 20mm x 250mm (4) hollow steel was the first material that measured. A total of two plates 4mm x 250mm x 250mm and 1mm x 250mm x 250mm of mild Steel plate was the next that will be measured. Then following with measured the round hollow steel that is D75mm x 200mm and D20mm x 20mm. All the measuring and marking process is done by using steel ruler, measuring tape, and steel marker.

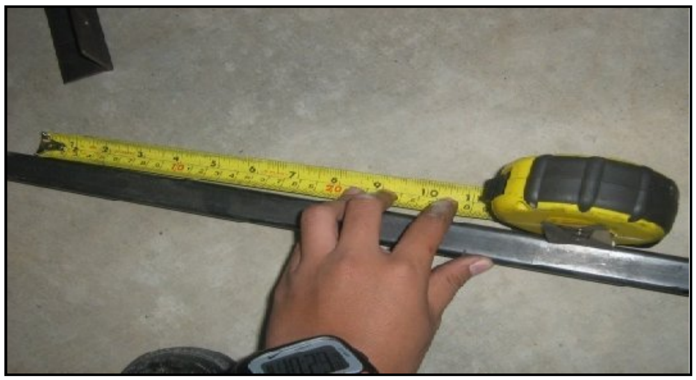


Figure 3.6: Measuring process

Then, after several quantities of material had been marked, the next step is to cut the material into its desired length. This process is done using hand saw, the shearing machine, floor cutter disc and cutting torch. Cutting torch are use to cut the arc or 360 degree angle. Before proceeding with this process, safety measurement had been carried out by wearing Personal Protective Equipment (PPE) such as goggle, gloves and ear plug. These safety measurements are so important in order to prevent the projectile spatter from the process. During this process, I'm using the L-shape in order to make sure the dimension of the material length is correct and precise.

Figure 3.7: Marking process for the cutting process

All the material that had been cut is grinded to give smooth surface on the edge to make sure that joining process can be done precisely. Then, hollow steel need to drill to make holes for bolts and nuts for the clamper. Press drill was used to drill the hollow steel. Next is the joining process.

The joining process was carried out by using the Gas Metal Arc Welding or formerly known as MIG (Metal Inert Gas). First, the welding machine is set up to make sure that the output of the process will satisfy. Face shield, apron, goggle and others PPE equipment are not to be forget. Then, all the materials were weld together. During this process, a minor movement of the materials will give bad effect to the joint and to the framework. It is because the hollow tube will expand and twist a little due to the temperature changes.

Figure 3.8: MIG welding process

After finished welding, the entire welded places were then grinded to make sure that the entire joint surface was smooth from any spatters or sharp edge. During the process, the careless of wearing an ear plug will cause high risky damage to ears. Hand gloves and goggles are also need to give attention.

After all the process had been done, come the last part that is tightening the bolt and nut use as a clamper.

CHAPTER 4

RESULTS AND DISCUSSION

The final fabrication of the can opener is done from only limited times due to several problems occur to the project. In this chapter will discuss mainly about the result of the project, analysis about the project and all problems encountered during the whole project was been carried out.

4.1 FINAL RESULT PROJECT

As a result, the Can Opener has been produced according the specification. Figure 4.1 show the final fabrication

Figure 4.1: Final Product Can Opener

4.2 STEP TO OPERATE CAN OPENER

i. Firstly, place the can at the center can opener.
ii. Then clamp the can.
iii. Adjust the blade follow the metal can.
iv. After that punch the can.
v. Use the twister hold to punch and to push the blade into the can.
vi. Twist the twister holder to cut the metal can.
vii. Lift up the twister holder to separate blade and punch from the can.
viii. Open the clamp.
ix. Take out the can.

4.3 STRESS ANALYSIS

The stress analysis of the material chosen is calculated with the following equation to avoid the exceed load.

Mild steel

Yield strength, = / (4.1)

, = (4.2)

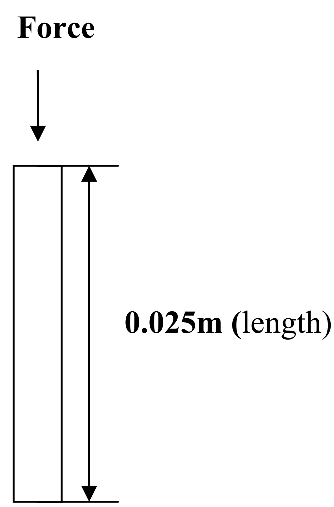


Figure 4.2: Force from the upper base

4.3.1 Hollow steel (supporter upper base)

Pressure that applied on the hollow steel, =

For testing the stress, assume the weight 100 kg at the upper base

$= 100\text{kg} \times 9.81$

$= 981\ \text{N}$

Area of hollow steel, $= 0.025 \quad \times 0.025$

$= 0.000625$

Stress on the hollow steel, $= 981 \quad \div 0.000625$

$=1.57$

Refer the table 3.2; the yield strength for mild steel is 250 . As result the hollow steel can support the weight the will apply on it because yield strength for this result is 1.57 and it is not over than 250 . How ever we need consider about factor of safety for this part.

Assume the safety factor = 2. Than multiple the safety with result of yield strength.

$1.57 \quad \times 2 = 3.14$

After I assume the factor of safety as a 2, the result of yield strength still not over than 250 and I assume this part is very strength to support upper base and it not easy to bend.

4.3.2 Plate Steel

Pressure that applied on the hollow steel, =

For testing the stress, assume the weight 100 kg to find the force.

= 100 × 9.81

= 981

Area of hollow steel, = 0.25 × 0.25

= 0.0625

Stress on the hollow steel, = 981 ÷0.0625

= 15.7

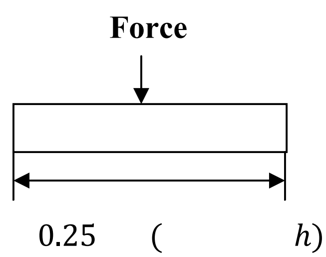


Figure 4.3: Force at the plate steel

Refer the table 3.5, the yield strength for this part is under the yield strength in the table. So, plate steel can support force 981 N than it not easy to broken or bend.

4.4 COST ANALYSIS

Before the product will be enter to the market decide the value of the product, first of all it must do a cost analysis to get the price per unit and get the profit. Table 4.1 show the price of every material.

Table 4.1: The price of material use

NO	ITEMS	QUANTITY	PRICE(RM)
1	STEEL	3	30.00
2	SCREW	4	3.60
3	SPRAY	1	6.00
	TOTAL		**39.60**

From the analysis cost, the labour cost is RM 0.50 per unit. For Shipping cost is RM 1.00 per unit. After sum the total price for material with labour cost and shipping cost, the new price for can opener is RM 41.10.

4.5 PROBLEM DURING FABRICATION PROCESS

The first problem in fabrication is the equipment cannot be used such as welding machine. Beside that, the hand cutter also cannot be used to cut our material because the motor was broken.

During welding process some problem has occurs. Using the MIG welding we need to set a suitable voltage. If the voltages to high, the material like mild steel will be melting.

CHAPTER 5

CONCLUSION AND RECOMMENDATION

In this chapter will discuss mainly about the conclusion of the project, concluding all the process that involved. Besides that this chapter also contains recommendation about the project. So for this recommendation for improvement in the future.

5.1 CONCLUSION

As a conclusion I think my objective for this project to design and fabricate the can opener had been archived. This project also generates my capabilities to fabricate the can opener using the fabrication part such as welding, drilling and so on. This product has strong body frame and stability when to cut the metal can. Beside that, this product has been fabricated with addition function such as clamper. The function of the clamper is to clamp the can from moving follow the blade cutting in cutting process.

5.2 RECOMMENDATION

Following recommendations can be making based on the improvement could be in the characteristics like a body frame that it I need to made it small than this product.

Beside that I also need to change the type of clamper that more suitable to clamp the tin because the clamper that already have can be broken the can. In the future also I should use all material should be lightweight and hardy.

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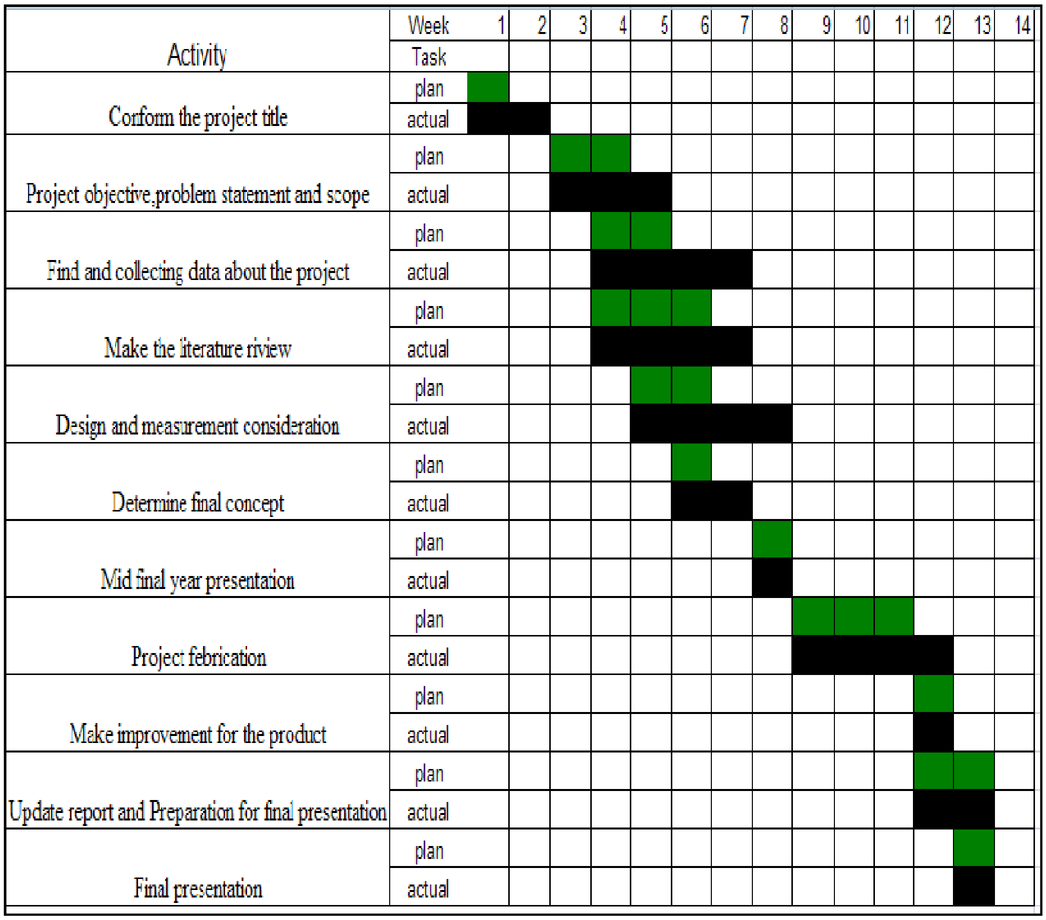
APPENDIX A

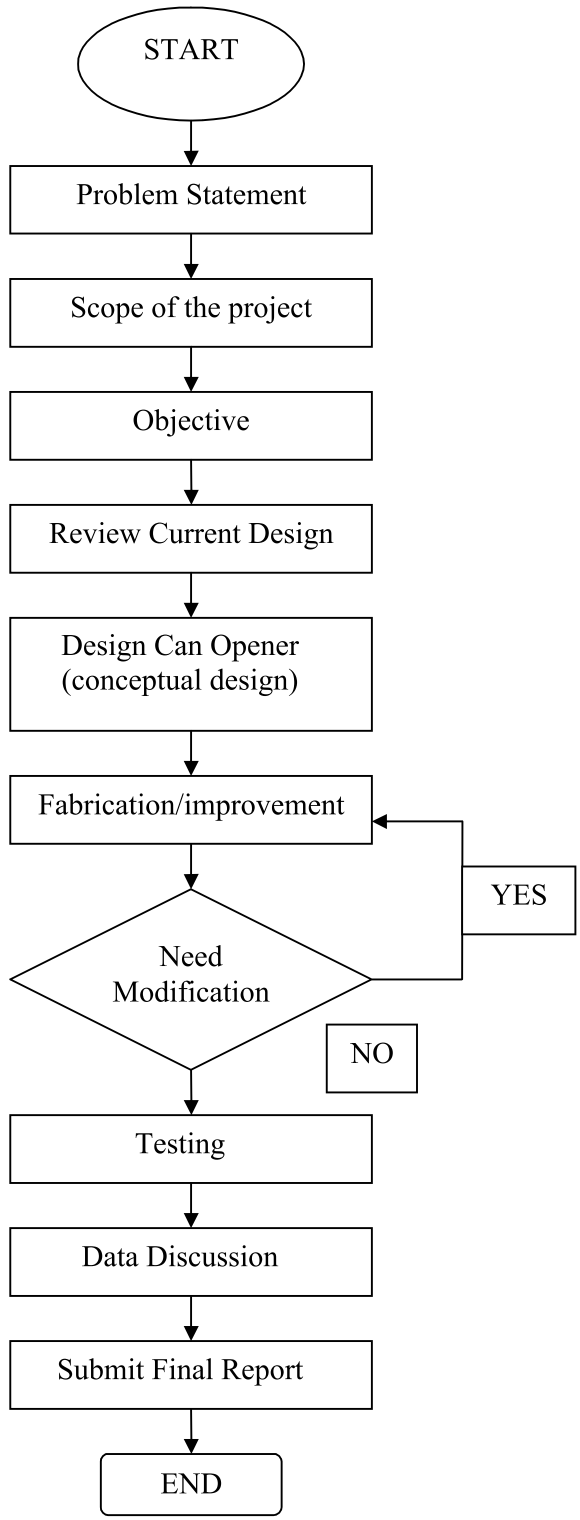
GANTT CHART

GANTT CHART


Activity
Week
Task
1
2
3
4
5
6
7
8
9
10
11
12
13
14
Conform the project title
Project objective,problem statement and scope
Find and collecing data about the project
Make the literature riview
Design and measurement consideration
Determine final concept
Mid final year presentation
Project febrication
Make improvement for the product
Update report and Preparation for final presentation
Final presentation
plan
actual

APPENDIX B

FLOW CHART


START
Problem Statement
Scope of the project
Objective
Review Current Design
Design Can Opener
(conceptual design)
Fabrication/improvement
YES
Need
Modification
NO
Testing
Data Discussion
Submit Final Report
END

FLOW CHART

APPENDIX C

TYPICAL OF YIELD STRENGTH

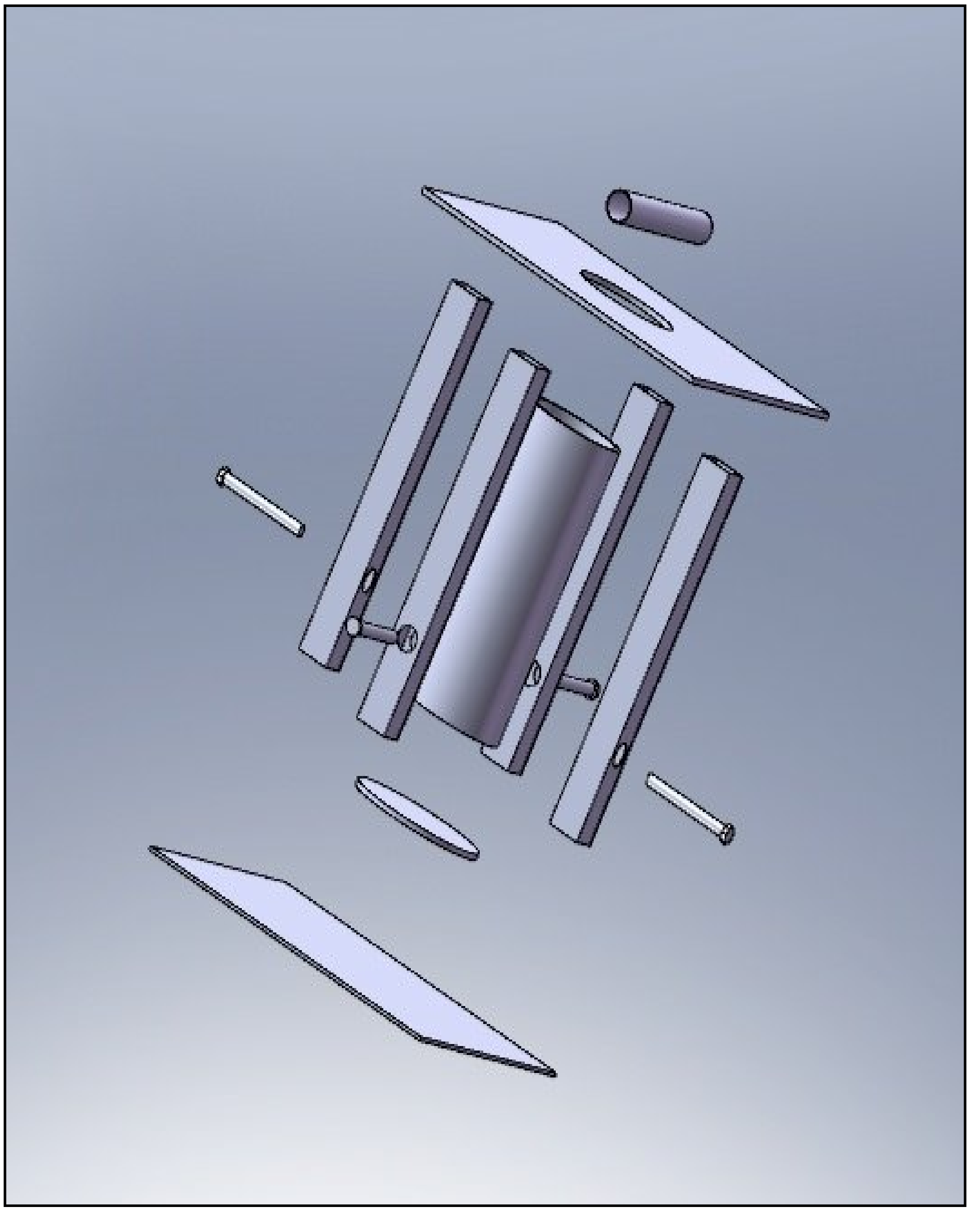
TYPICAL YIELD STRENGTH

Material	**Yield strength (MPa)**	**Ultimate strength (MPa)**	**Density (g/cm^3)**
Structural steel ASTM A36 steel	250	400	7.8
Steel, API 5L X65 (Fikret Mert Veral)	448	531	7.8
Steel, high strength alloy ASTM A514	690	760	7.8
Steel, prestressing strands	1650	1860	7.8
Steel Wire			7.8
Steel (AISI 1060 0.6% carbon) Piano wire	2200-2482 MPa		7.8
Stainless steel AISI 302 - Cold-rolled	520	860	
Cast iron 4.5% C, ASTM A-48	276 (??)	200	
Titanium alloy (6% Al, 4% V)	830	900	4.51
Aluminium alloy 2014-T6	400	455	2.7
Copper 99.9% Cu	70	220	8.92
Cupronickel 10% Ni, 1.6% Fe, 1% Mn, balance Cu	130	350	8.94
Brass	approx. 200+	550	5.3
Tungsten		1510	19.25
Glass		50 (in compression)	2.53

APPENDIX D

DRAWING

ASSEMBLY DRAWING



APPENDIX E

OBJECTIVE TREE

OBJECTIVE TREE PROJECT