UNIVERSITI MALAYSIA PAHANG

BORANG PENGESAHAN STATUS TESIS

JUDUL: **DESIGN AND FABRICATE AL-QURAN AND BOOK RACK FOR UMP MOSQUE**

SESI PENGAJIAN: 2009/2010

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DESIGN AND FABRICATION AL-QURAN AND BOOK RACK FOR UMP MOSQUE

AMIR YUSRI BIN MOHD YUSOF

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

Faculty of Mechanical Engineering
UNIVERSITI MALAYSIA PAHANG

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 Diploma in Mechanical Engineering.

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STUDENT'S DECLARATION

I hereby 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 degree and is not concurrently submitted for award of other degree.

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I acknowledge my sincere indebtedness and gratitude to my parents for their love, dream and sacrifices 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 reach my goals.

ABSTRACT

The objective of this project is to design and fabrication Al-Quran and Book Rack for UMP Mosque. This book rack is important equipment because it reduces the work area of a person and provides a practical and suitable place to put their tools while working. However, former book rack is not acceptable because it too small and not friendly user like cannot move. The normal book rack in the market is not have enough features because it not has any drawer and cannot protect the book from the dust. With this new concept, maybe the market of the new book rack can increase and automatically can give the best service to users.

ABSTRAK

Objektif projek ini adalah untuk mereka dan membentuk Rak Al-Quran dan buku untuk Masjid UMP. Rak buku merupakan suatu peralatan penting di mana ia mengecilkan kawasan kerja and menyediakan tempat yang praktikal dan sesuai untuk meletakkan peralatan semasa bekerja. Namun begitu, rak buku yang terdapat di pasaran tidak begitu memuaskan hati kerana kawasan simpanan buku yang kecil dan tidak mesra pengguna kerana tidak boleh bergerak. Rak buku yang selalu terdapat dipasaran juga tidak mempunyai ciri-ciri yang terkini seperti mempunyai laci dan dapat menghalang habuk dari mengenai buku. Dengan adanya konsep baru ini, mungkin pasaran rak buku akan meningkat dan seterusnya akan memudahkan pengguna di sekelilingnya.

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P_w	Pressure - Pressure that applied on the hollow rectangular steel (*Pascal*)
σ_c	Stress - Stress on the hollow rectangular steel (*Mpa)*
A	Area - Area of rectangular steel (m^2)
ft	Feet - measurement for rectangular hollow bar
Kg	Kilogram – the force that apply to the stainless steel bar
m	meter - measurement for rectangular hollow bar
MPa	Mega Pascal – the pressure that apply to the stainless steel bar
N	Newton
P	Pressure (*Pascal*)
RM	Ringgit Malaysia

LIST OF ABBREVIATIONS

CAD	-	Computer Aided Design
DC	-	Direct Current
EP	-	Electrode Positive
GMAW	-	Gas Metal Arc Welding
MIG	-	Metal Inert Gas Welding
UMP	-	UNIVERSITI MALAYSIA PAHANG
SW	-	South West
EW	-	East West

CHAPTER 1

INTRODUCTION

1.1 Background

This chapter explained about the project objectives, project background, project scope, and problem statement. This chapter also covers the project flow of this project. This book and Al-Quran rack is design to give it more use full by make it easy to attach for UMP students and staff that use UMP mosque. The design is generate by my own idea that use the concept that I had from internet, supervisor and my friends. The specification of this rack is can moving and can keep out the Al-Quran and book from dust. Besides of that features, the book rack can give more storage space for book. This design also can reduce the space of UMP mosque area. It also can carry any flyers anywhere around the UMP mosque prayer hall area.

1.2 Problem Statement

A few problems occur when designing the concept design, the problem found when want to increasing the capacity of the storage space for books but it must easy to attach anywhere. For the material, the chipboard is not suitable due to it shape. From this problem, the solution the solution is to change the material from chipboard to plain and thin zinc plate.

1.3 Objective

The project objectives are to design and to fabricate a Al-Quran and book rack for UMP MOSQUE.

1.4 Scope

i. **Cost:** minimized the fabricating cost.
ii. **Structure Strength:** the maximum load that the structure can support is below 65 kg.
iii. **Uses:** this rack are friendly uses and easy to attach.
iv. **Special future:** the special function that this rack has is it can reduce the dust to come into the rack or attach the book.

CHAPTER 2

LITERATURE REVIEW

2.1 Introduction

The purpose of this chapter is to provide a review of past research efforts related to multifunction book rack. A review of other relevant research studies is also provided. Substantial literature has been studied on history, types of rack and material needed.

2.2 History of Rack

In 1965 a durable fiber reinforced plastic 19-inch rackmount case was patented by ECS Composites and became widely used in military and commercial applications for electronic deployment and operation. State-of-the-art rackmount cases are now also constructed of thermo stamped composite, carbon fiber and DuPont's Kevlar for demanding military and commercial uses.[1]

2.3 TYPE OF BOOK OR MAGAZINE RACK

2.3.1 Magazine Rack

Figure 2.1: Magazine Rack

Source: IKEA 2004

The Key features

Also suitable for storing newspaper.

The care instructions

This rack cannot be painted or spray and place at dry area.

Product description & measurements

Frame: Steel and fiber glass

- **i.** Lenght: 49 cm
- **ii.** Width: 55 cm
- **iii.** Height: 39cm

2.3.2 Slope Rack

Figure 2.2: Slope Rack

Source: IKEA 2004

The Key Features

This product requires assembly environment shelf/corner shelf .

Care instructions Metal

Wipe clean with a damp cloth. Use only water or a non-abrasive detergent.

Wipe dry with a clean cloth.

Product description & Measurements

100% wood

- **i.** Height: 120 cm
- **ii.** Width left: 105cm
- **iii.** Width right: 105 cm

2.3.3 Sloping Rack (Moving)

Figure 2.3: Slope Rack

Source: IKEA 2004

Care instructions Metal

Wipe clean with a damp cloth. Use only water or a non-abrasive detergent. Wipe dry with a clean cloth.

Product description & measurements

Main parts: Stainless steel

Height: 30 cm

Depth: 18 cm

Height: 22 cm

2.4 TYPE OF MATERIAL

2.4.1 Body Structure

2.4.1.1 Stainless Steel

In metallurgy, stainless steel is defined as a steel alloy with a minimum of 10% chromium content by mass. Stainless steel does not stain, corrode, or rust as easily as ordinary steel but it is not stain-proof. It is also called corrosion-resistant steel or CRES when the alloy type and grade are not detailed, particularly in the aviation industry. There are different grades and surface finishes of stainless steel to suit the environment to which the material will be subjected in its lifetime. Common uses of stainless steel are cutlery and watch straps.

Stainless steel differs from carbon steel by amount of chromium present. Carbon steel rusts when exposed to air and moisture. This iron oxide film is active and accelerates corrosion by forming more iron oxide. Stainless steels have sufficient amount of chromium present so that a passive film of chromium oxide forms which prevents further surface corrosion and blocks corrosion spreading in the metal's internal structure.[2]

2.4.2 Roller Part

2.4.2.1 Plastics

Plastic is the general common term for a wide range of synthetic or semisynthetic organic amorphous solid materials suitable for the manufacture of industrial products. Plastics are typically polymers of high molecular weight, and may contain other substances to improve performance and/or reduce costs. The word derives from the Greek "fit for molding", from "molded". It refers to their malleability or plasticity during manufacture, which allows them to be cast, pressed, or extruded into an enormous variety of shapes such as films, fibers, plates, tubes, bottles, boxes, and much more.

The common word "plastic" should not be confused with the technical adjective "plastic", which is applied to any material which undergoes a permanent change of shape (a "plastic deformation") when strained beyond a certain point. Aluminum, for instance, is "plastic" in this sense, but not "a plastic" in the common sense; while some plastics, in their finished forms, will break before deforming and therefore are not "plastic" in the technical sense.[2]

2.5 JOINING METHOD

Joining involves in assembly stage. Commonly used method to join metal part is Metal Inert Gas (MIG) welding.

Figure 2.4: Metal Inert Gas (MIG) Welding
Source: WIKIPEDIA 2004

2.5.1 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.[3]

The MIG-process 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. [3]

There are two different MIG-welding processes, conventional MIG and pulsed MIG:

i. 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. [3]

ii. 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.[3]

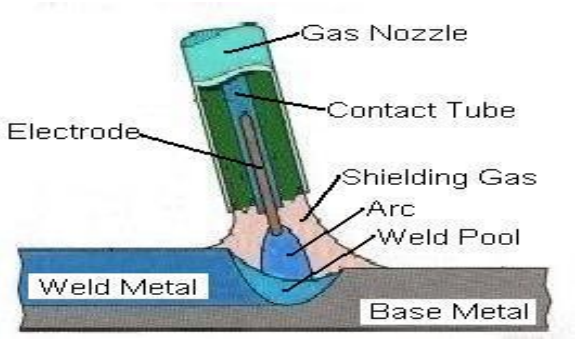


Figure 2.5: Schematic of Metal Inert Gas (MIG) Welding

Source: WIKIPEDIA 2004

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

i. All position capability
ii. Higher deposition rates than SMAW
iii. Less operator skill required
iv. Long welds can be made without starts and stops
v. Minimal post weld cleaning is required

The disadvantages of MIG welding

i. Costs money of consumable, such as tips and nozzles
ii. Is not worth a dang on paint, rust, or dirty surfaces
iii. No good for thick steel because it does not get the proper penetration

2.6 DRILLING

Drilling is easily the most common machining process. One estimate is that 75% of all metal-cutting material removed comes from drilling operations. Drilling involves the creation of holes that are right circular cylinders. This is accomplished most typically by using a twist drill, something most readers will have seen before. The chips must exit through the flutes to the outside of the tool. As can be seen in the figure, the cutting front is embedded within the work piece, making cooling difficult. The cutting area can be flooded, coolant spray mist can be applied, or coolant can be delivered through the drill bit shaft. [4]

2.6.1 Hand Drill

A hand drill is shown in the figure 2.8. Compared to other powered metal cutting tools, a hand drill is fairly simple safety and easy to handle.

Figure 2.6: Hand Drill

2.7 GRINDING PROCESS

Grinding 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. [4]

Figure 2.7: Hand Grinder

CHAPTER 3

METHODOLOGY

3.1 INTRODUCTION

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, I 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.

3.2 PROJECT METHODOLOGY

i. Identify the problem statement and find the solution.
ii. Concept design.
iii. Finalize concept and evaluation.
iv. Material selection.
v. Fabrication process.
vi. Testing and improvement process.
vii. Finishing.

3.3 DESIGN

The Design of the can opener must be compliance to several aspects. The design consideration must be done carefully so the design can be fabricated and the parts are all functioning. The aspects that must be considered in designing the book rack are:

i. **Strength**: Must have certain strength to ensure the book rack can support the load that given from books.
ii. **Suit to environment**: The book rack must be suitable to be use UMP Mosque area.
iii. **Durability**: The book rack can be use in several years.
iv. **Safe**: The book rack must safe for the user and it not harms the user.

3.4 COMPUTER AIDED DESIGN

After a design has been selected, the next step in the designing process is dimensioning. The dimensioning is base on relevant dimensions and also referring to the existence can opener so that the design is fit into others part.

After dimensioning, the engineering drawing of the design is drawn using Solidworks application, 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 base on the design.

3.6 CONCEPT METHOD SELECTION

The concept method must be considered with 2 method:

i. **Concept generation**.
ii. **Concept screening**.

3.7 CONCEPT GENERATION

Concept generation is a concept that we can make to design our product. It include about the part-part we need to do. This is a concept generation four my product:

3.7.1 Concept A

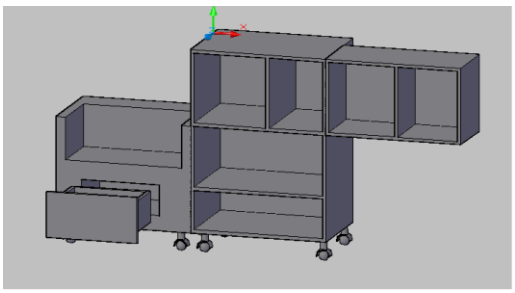


Figure 3.1: Concept A

This advantages of concept A is can moving anywhere and it has big storing spaces than concept B and C. The features of this rack can close and join together and can keep the book from dust and can give more durability for book that keep in this rack. The disadvantages is in small amount that is sharp edge and high cost production.

3.7.2 Concept B

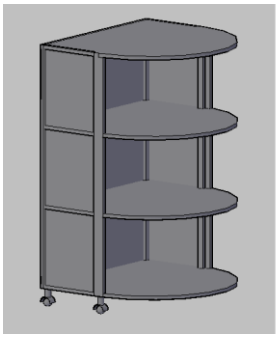


Figure 3.2: Concept B

The concept B is the second simplest concept that have been draw. The advantages of this concept is can moving, has curving structure that can give more attractive if it has been produce but the disadvantages of this concept are less spaces and cannot protect book from dust.

3.7.3 Concept C

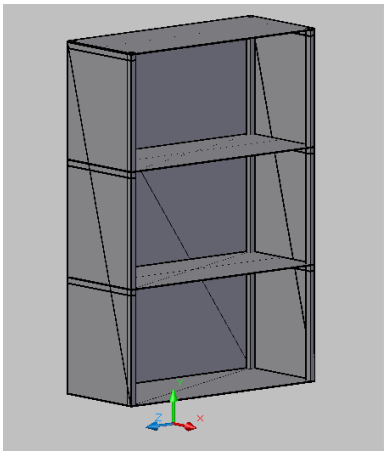


Figure 3.3: Concept C

This concept is the simplest concept that is less advantage that is only big but cannot protect the book from dust. Furthermore, this concept never attract any user if it be produce.

3.7.4 Concept D

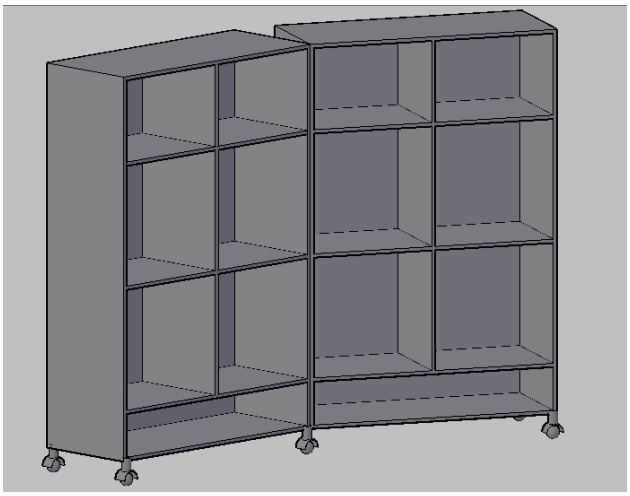


Figure 3.4: Concept D

This concept have many advantage that is has big spaces, strong structure, easy attach to user, can moving and also can protect book from dust. This concept have only two disadvantages that is heavy and not have drawer.

3.8 CONCEPT SCREENING

Table 3.5: Concept Screening

Selection / Criteria	Concept A	B	(Datum) C	D
Easy to attach	+	+	0	+
Moving	+	+	0	+
Low cost	-	0	0	-
Big storage space	+	0	0	0
Dust free	+	-	0	+
Book durability	+	+	0	+
+ pluses	5	3	0	4
o same	0	2	6	1
- minus	1	1	0	1
net	4	2	0	3
rank	1	3	4	2
continue	Yes	no	no	no

3.8.1 Final concept.

After take every sight the final concept in design one, this is solidwork design of final design.

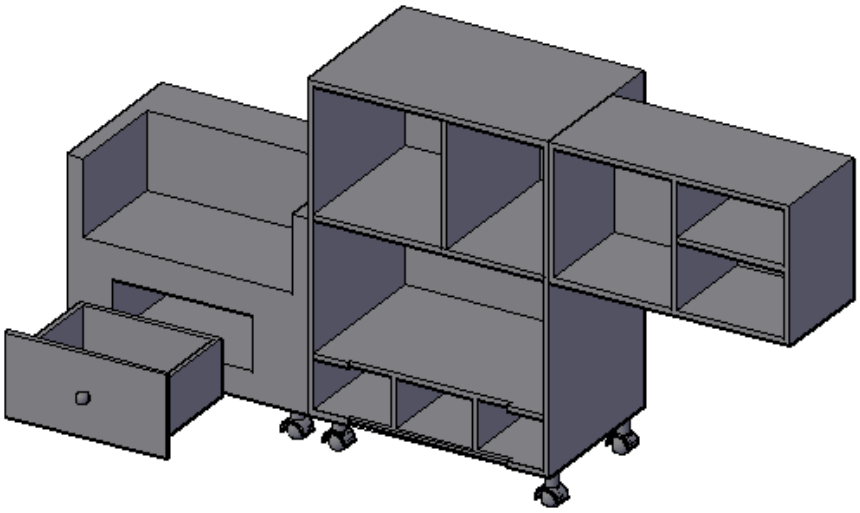


Figure 3.5 : SW view

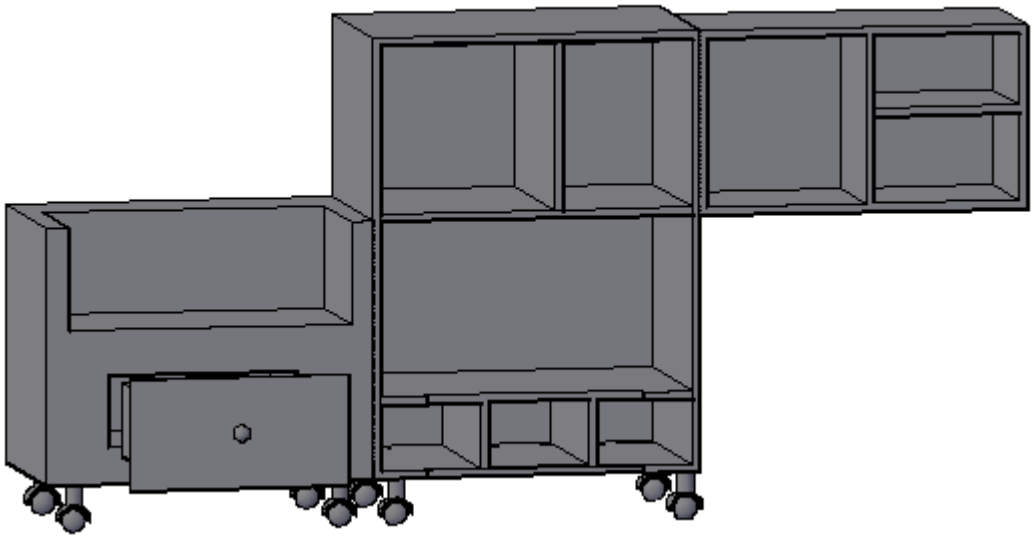


Figure 3.6 : EW view

3.8.2 Explanation of Concept B,C and D

This concept was selected base on three concept, concept B, concept C and concept D. From that three concept, the concept A design are get from the combination of concept B and concept D. The concept C is the datum concept that is very simple and not has many special features to bring out. Concept B is okay but it not follow the scope of the project that is want to protect the book from dust. Concept A is get when the Concept D is being finalized and being upgraded.

3.9 MATERIAL SELECTION

MATERIAL SELECTION

Table 3.6 : Material Selection

Component	Material
Body Structure	Stainless steel
Body cover	Zinc
Tire	Plastic
Hasp	Mild steel

Table 3.7 : Yield Strength

Material	Weight kN/m³	Modulus of elasticity GPA	Modulus of rigidity GPA	Yield strength		Coefficient of thermal expansion
				Tension	Shear	
Stainless Steel		190	73	520		17.3
Mild Steel	77	200	79	250	400	0.27

3.10 BILL OF MATERIAL

Table 3.8: Bill Of Material

BIL	TYPE	SIZE (mm)	QUANTITY
1	Rectangular Hollow Steel	15 x 15 x 3050	8
2	Zinc	910 x 1 x 2440	1
3	Plastic Tire	D20x15	8

3.11 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, 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 than manufacturing process that focus to large scale production. In the project fabrication process needed to make the base plate, framework of display board. Fabrication process was used at the whole system production. This was include part by part fabrication until assembly to others component.

3.11.1 Process Involve

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

i. **Measuring**: Materials are measured to desired dimensions or location.
ii. **Marking**: All measured materials need to be marked to give precise dimension.
iii. **Cutting**: Marked materials are then cut into pieces.
iv. **Joining**: Materials joined by the method of welding.
v. **Drilling**: Marked holes are then drilled to make holes for bolts.
vi. **Finishing and Painting**: Any rough surface cause by welding spark were grind to give smooth and safe surface and the surface of the steel component will be paint to avoid rust.

3.11.2 Step By Step Process

The fabrication process was started with measuring the material into the required dimension. 15mm x 15mm x 3050mm Rectangular hollow steel was the first material that measured. 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, using the L-shape is required in order to make sure the dimension of the material length is correct and precise. 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. 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. 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 body structure has been joined, paint the entire of the structure body to avoid the surface become rusty. The last step is covered the body structure using the zinc. This zinc is joined by rivet pop and before this the place that want to be joined by rivet must be drill to make hole for the blind rivet.

3.13.3 FABRICATION PROCESS

Figure 3.7: Measuring the rectangular bar

The stainless steel has been measured by measuring tape

Figure 3.8: Marking the measured point

After the stainless steel bar is measured, it must been marking by table marking because the marking line of this device is very precision.

Figure 3.9: Cutting the rectangular bar with disc cutter

The stainless steel bar has been cut by disc cutter to give it straight cut.

Figure 3.10: Joining the rectangular bar

This joining methods used MIG method because it give clean, easy and perfect joining.

Figure 3.11: Grinding the joining point

The joining part must be grind by hand grinder to give clean and safety finishing.

Figure 3.12: Painting the body structure

The structure that has finished joined and grinded must be paint to avoid rusty surface.

Figure 3.13: Drilling the rivet point

The hand drill is use to make hole before can rivet the structure with the zinc plates.

Figure 3.14: Rivet the zinc against body structure

The joining method of rivet can give very tight joint. That is why we choose this type of joining.

CHAPTER 4

RESULTS AND DISCUSSION

4.1 INTRODUCTION

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.

4.2 RESULT

This figure shown about the result for my project:

Figure 4.1: Book Rack

This is when the rack is open and ready to use

Figure 4.2: Book Rack

This is when the rack is close and can push it anywhere.

4.2.1 Basic part

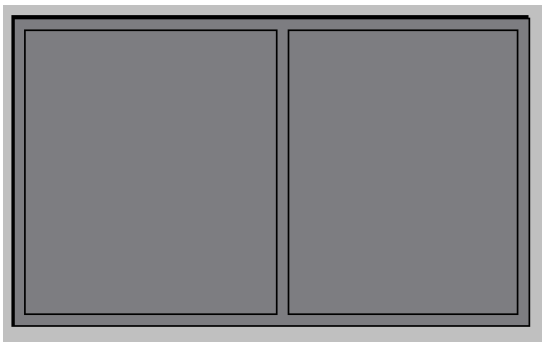


Figure 4.3: Top Part

This is the top part that only can put the small book like " Yasin or Al Mathurat"

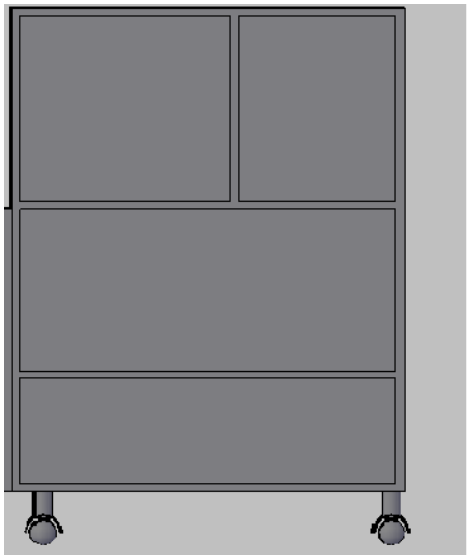


Figure 4.4: Base Part

This is the base part that can store "AL-Quran" and other big or heavy books.

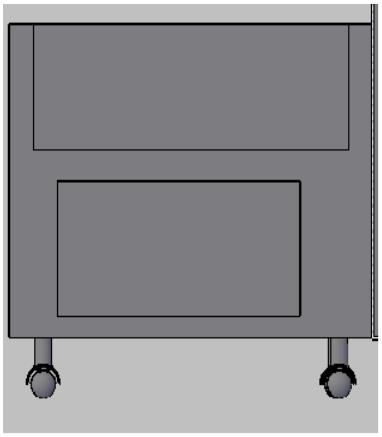


Figure 4.5: Lid Lower Part

This part is the second lower part that has drawer to store anything expensive for a short time because it not has any lock.

4.3 STANDARD OPERATION PROCEDURE

4.3.1 How it work.

i. It can be open and close

Figure 4.6: Open side

The figure show when the book rack is open

Figure 4.7: Close side

This figure show this book rack close

ii. It can moving

iii. It is multiple uses

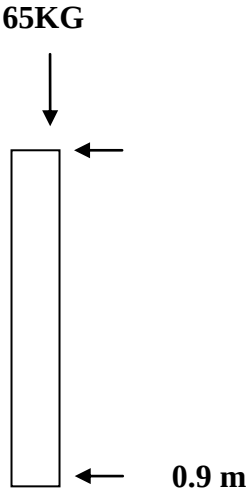
4.4 ANALYSIS OF THE METAL

4.4.1 Stress Analysis

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

Mild steel: hollow steel for supporter upper base.

Yield strength, σ = P/ A



4.4.1.1 Hollow Rectangular Steel (support upper base)

Pressure that applied on the hollow steel, P_w = Force

For testing the stress, I assume the weight 65 kg.

Force = 65 x 9.81

= 637.65 N

Area of hollow rectangular steel, A_c = 0.015m x 0.015m

= 0.000225m^2

Stress on the hollow rectangular steel, σ_c = 637.65 N / 0.000225 m^2

= 2.834 MPa

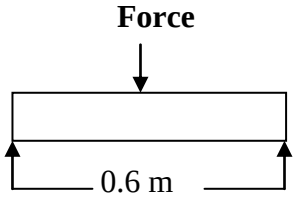
From the **Table 3.7**, the yield strength for stainless steel is 520 MPa. As result the hollow rectangular steel can support the weight the will apply on it because yield strength for this result is 2.834 MPa and it is not over than 520 MPa. How ever we need consider about factor of safety for this part.

Assume the factor of safety = 2
2.834 MPa x 2 = **5.668 Mpa**

After I assume the factor of safety as a 2, the result of yield strength still not over than 520 MPa and I assume this part strength is very high to support upper base and it not easy to bend.

4.4.1.2 Hollow Rectangular Steel (support the lower base)

Pressure that applied on the hollow rectangular steel, P_w = Force
For testing the stress, I assume the weight 65 kg.
Force = 65 x 9.81
= 637.65 N
Area of hollow rectangular steel, A_c = 0.015m x 0.015m
= $0.000625m^2$
Stress on the hollow rectangular steel, σ_c = 637.65 N ÷ $0.000625m^2$
=1.02 MPa



Go to the **Table 3.7** again, the yield strength for this part is under the yield strength in the table. So, hollow rectangular steel can support force 981 N than it not easy to broken or bend.

4.5 COSTING

Table 4.1: Manufacturing cost

NO	ITEMS	QUANTITY	PRICE (RM) / UNIT
1	HOLLOW RECTANGULAR STEEL	10 BAR (1 BAR = 20 ft)	9.85
2	ZINC	2 (3 x 8 ft)	45.00
3	SPRAY	2	6.00
4	TIRE / ROLLER	2 (SET / 4 WHEELS)	12.00
5	OTHERS	-	
	TOTAL		**RM 292.50**

Labour cost = RM 0.50 per unit x 16 = RM 8.00

Shipping cost = RM 1.00 per unit x 16 = RM 16

Total + labour cost + shipping cost = RM 292.50 + RM 8.00 + RM 16.00

= RM 316.50

4.6 PROJECT PROBLEMS

4.6.1 Literature Review: The concept and ideas review for this project are not very wide because it is not widely modified by the manufacturer. Students should come with their ideas on the project.

4.6.2 Designing & Sketching: Because of the idea were from the student directly, so there are no references that can be referred. All the drawing and dimension need to generate by student itself.

4.6.3 Fabrication Process: Students need to be given more time to finish fabricating their product because of slackness of skill and training, the joining finishing was not so god but yet can still reliable.

4.6.4 Material Preparation: Some of the needed material needs to buy at the city. University should prepare the material or either provides the place where the material can be obtained from.

4.6.5 Budget Preparation: It is not so effective to use student's money to get the materials. University should provide budget at first stage so that student's expenses are not interfere.

4.7 PROBLEM DURING FABRICATION PROCESS

4.7.1 Material

Problem during this stage is very critical when the certain of the material need to buy by student in city or other place. So, this time we need to use our money to buy it. Certain student need to delay their project because no enough money to buy the material.

4.7.2 Welding Process

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.

4.7.3 Equipment

The first problem in fabrication is a 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.

4.7.4 Laboratory location.

The Mechanical Metal Foaming Laboratory in Kuala Pahang, Pekan is located far from UMP Gambang. The students need to make bus reservation to go there. Furthermore, the trip to Kuala Pahang needs to take around two hours. In that two hours, the students can do their final year project if the metal foaming laboratory is still at Gambang.

CHAPTER 5

CONCLUSION AND RECOMMENDATION

5.1 CONCLUSION

As a conclusion we think my project had been practice me before start the practical. It is because we had learned a lot of skills and method of using several of machines. We also had using internet to search a lot of things that connect with my project. Based on this literature review, I had found many types of book rack with different design. Besides that, we also can gain my knowledge about the material type, structure and others else. Within a short time to finish the project, there are a lot of problems that must be solve quickly because there is no enough time if we delay to settle it.

This project also generates my capabilities as a responsibility person. This is because we had to take care and take a look for my project. Beside that, we also had made a meeting with my supervisor for a discussion about my progress of work and the progress of report. So by the time we also can make some improvement and learn how to share others opinion and idea to make my product better. Finally for the last, we can conclude that final year project is very important because it can make our self more discipline and be punctually on time in whatever work we do. We also have achieved my objective and a scope of project about design and fabricate a book rack using my idea.

5.2 RECOMMENDATION

5.2.1 Facilities

Based on the progress of the project that we had done, so many things in facilities aspects can be improved especially in welding process. It is because the MIG welding machine doesn't have enough quantity for the student user. So the faculty especially must provide more welding machine for the student user because amount of student is increasing year by year.

5.2.2 Student Budget

Some of the materials also need the student to buy such the things that doesn't have in mechanical laboratory. For the budget, the faculty should provide the budget to student at first. 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 task to complete in a good ways and also give more time to focus on others subject.

5.3 FUTURE WORK

The final year project is a most important subject that must be learns in the final semester. It is because this project can make the student practice their skill of machining process since semester one. Its include using welding machine, drilling machine, CAD software, Solidwork software and others else. So for my book rack project, I think a lot of things can be improved in the future. 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 design that more suitable to avoid sharp angle that can harm the user. In the future also I should use all material should be lightweight and strong. Besides that, the financial is very important to develop more functional book rack and could be produce to the market in the future.