

UNIVERSITI MALAYSIA PAHANG

BORANG PENGESAHAN STATUS TESIS

JUDUL: PORTABLE AND FOLDABLE WET CLOTHES HANGER

SESI PENGAJIAN: 2008/2009

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PORTABLE AND FOLDABLE WET CLOTHES HANGER

MOHAMAD RUZAINI BIN MOHAMED IBRAHIM

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

Faculty of Mechanical Engineering
UNIVERSITI MALAYSIA PAHANG

NOVEMBER 2008

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

Signature :

Name of Supervisor :

Date :

STUDENT'S DECLARATION

I hereby declare that the work in this thesis is my own except for quotations and summaries which have been duly acknowledged. The thesis has not been accepted for any degree and is not concurrently submitted for award of other degree.

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DEDICATION

Firstly, I would like to show my expression to Allah s.w.t whose guidance, help and grace was instrumental in making this work become a reality. I would also like to thank my respected lecturer, Mr. Zulkifli Bin Ahmad @ Manap and all lecturers who had guide and help me a lot to complete this task.

This dedication also goes to my beloved family which is my father Mr. Mohamed Ibrahim Bin Abdul Hameed, my mother, Mrs. Latiffa Bt. Sultan and family, without then my pursuit of higher education would not have been possible. Also thanks a lot to the university administration and friends in their support and advice towards this project. Lastly, thanks to all those had help me to complete my task.

ACKNOWLEDGEMENT

I would like to express my gratitude and appreciation to all those who gave me the possibility to complete this report. Special thanks is due to my supervisor, Mr. Zulkifli Bin Ahmad @ Manap whose help, stimulating suggestions and encouragement helped me in all time of fabrication process and in writing this report. I am very grateful to him for his patience and his constructive comments that enriched this project.

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 laboratory equipment and also the machine and giving a permission to use all the necessary tools in the laboratory.

Special thanks too go to Mr. Zamri Bin Ahmad, as the Final Year Coordinator, who has helping a lot and give some advice and share his knowledge on how to complete this task in the right way.

I also want to thank to all my friends for their support and help to complete the task and for sharing their knowledge on how to solve the problems. Finally, I thank my family for their continuous support and confidence in my efforts.

ABSTRACT

The clothes hanger is used to hang the wet clothes that are washed. Development of this portable and foldable wet clothes hanger is to create a new model of clothes hanger that is foldable and portable and to fulfill current market needs. To design and fabricate this portable and foldable clothes hanger, it must be compared with other product that maybe available in the market. First, get an idea from internet, magazine, newspaper or other from available data. From there the information and idea to design and fabricate can be created. The whole project involved various method and process that usually use in engineering such as concept design, analysis process and lastly fabrication process.

This portable and foldable wet clothes hanger is made from aluminium. The height of this hanger can be adjusted according to users taste. It also can be easily moved because of its size and weight. When it is not used, it can be folded and only needed small place to store. Overall from this project, time management and discipline is important to make sure this project goes smooth as plan and done at correct time.

ABSTRAK

Ampaian baju digunakan untuk menyidai pakaian basah yang telah dibasuh. Penghasilan ampaian yang mudah dibawa dan boleh dilipat ini adalah untuk mencipta model terbaru ampaian yang boleh lipat dan mudah dibawa untuk memenuhi kehendak pasaran terkini. Untuk menreka dan menghasilkan ampaian boleh lipat dan mudah dibawa ini, ianya mesti dibandingkan dengan produk yang sedia ada dipasaran. Pertama sekali, dapatkan idea daripada internet, majalah, suratkhbar atau daipada data-data lain. Daripada maklumat yang ada, idea dan penghasilan ampaian ini boleh dilakukan. Keseluruhan projek ini merangkumi pelbagai kaedah dan proses yang biasanya digunakan di dalam kejuruteraan seperti merekacipta, analisis proses dan akhir sekali proses membina ampaian tersebut.

Ampaian boleh lipat dan mudah dibawa ini diperbuat daripada aluminium. Ketinggian ampaian ini boleh diubahsuai mengikut citarasa pengguna. Ianya juga mudah dibawa disebabkan saiz dan beratnya. Apabila tidak digunakan, ampaian ini boleh dilipat dan hanya memerlukan ruang yang kecil untuk disimpan. Secara keseluruhannya, pengurusan masa dan disiplin adalah penting untuk memastikan projek ini berjalan dengan lancar seperti yang dirancang dan dapat disiapkan pada masa yang ditetapkan.

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CHAPTER 1

INTRODUCTION

1.1 Project Synopsis

1.1.1 General Project Synopsis

This project was purpose to design and fabricate the portable and foldable wet clothes hanger. This project involves designing and fabricating the clothes hanger. I need to create a clothes hanger that is easy to bring anywhere and easy to store when not used because, nowadays people having problem to store and carry the clothes hanger. As the Diploma final year project allocates the duration of one semester, this project was participate by me alone to finish the clothes hanger. This project need a lot of skills such as using Solidworks , running Truma Bend V Series(bending machine), drilling machine, grinding and welding process.

The project title is “Design and fabricate a new concept of portable and foldable wet clothes hanger”. This project involves the fabrication of the clothes hanger with a specification regarding strength, material and cost. With the newly designed and fabricated this clothes hanger, tests are required to be conducted and to verify the design. Overall, this project will acquire the skill of design and fabrication.

1.2 Project Problem Statement

According to the market, the already exist clothes hanger are not suitable and comfortable. This is because the hanger is big and hard to move when raining, those who are leaving in condominium also don't have enough space to place the hanger when not used. To solve the problem, I have design a portable and foldable wet clothes hanger that is easy to use, easy to carry and stored when not used.

1.3 Project Objective

1.3.1 General objective

The purpose of this project is to practice the student to solving problem using academic research and also to gain knowledge and skill. This project is also important to train and increase the student capability to get information, research, data gathering and then solves the problem by following the procedures learned. The project also will generate students that have capability to get a good research report in thesis form or technical writing. This project also train and produce student to capable of doing work with minimal supervisory and more independent.

1.3.2 Specific Project Objective

- a) Design and fabricate the portable and foldable wet clothes hanger
- b) Fabricate the clothes hanger that has the aesthetic value as desired by the current market.
- c) Produce the minimum cost and high quality of the clothes

1.4 Project Scope of Work

This project require precise scope of work and proper plan need to be followed because this project must through various process before it would be produce. These are scope of work in this project:

1.4.1 Literature review

The clothes hanger is used from generation to generation to hang the wet clothes. Nowadays, there are many types of clothes hanger in market with various size, function, and material.

1.4.2 Design concept

Three concept of the clothes hanger is sketched. The concept then analyzed according several criteria and specification.

1.4.3 Finalize concept

The result of the analysis used to design a new clothes hanger that fulfill all the criteria and specification. The concept improved using Solidwork software.

1.4.4 Concept fabrication

The next step is fabricating the clothes hanger using appropriate material and laboratory equipment.

1.4.1 Writing report

Report of the all processes of this project is done. The report state all the process, method used and problem encountered during making this project.

1.4.2 The product should be portable and foldable.

The product specifications are it must be portable, foldable and minimum in cost. This is to make sure the product fullfill current market needs and can compete with already exists clothes hanger.

1.5 Project Background

This clothes hanger is functioning as a product which can be used to hang the wet clothes to make it dry. The designs is improved everyday in order to give the comfortable to the users. Nowadays, people having problem with their clothes hanger because it is not portable and difficult to store it when unused. So, this portable and foldable wet clothes hanger has been designed. The design should be creative, simple, easy to use, easy to handle, portable and minimum cost. This clothes hanger only needs a small place to store it when unused. The height of this hanger is adjustable and can be folded. It is also light because it made from aluminium.

According to table 1.1, the project starts with the briefing from the supervisor in week 1. Then, continued with literature review starting from week 2 until week 5. The literature review is all about gathering information about the clothes hanger.

The process continued with idea development from week 3 to week 6. On this stage, literature review is analyzed to find out the current type of clothes hanger and the current user need. From week 4 to week 7 is idea development process. On this stage, the clothes hanger is sketch into 3 types of designs. After that, the designs are analyzed and the best design is selected. This task takes time about three weeks.

On week 8, the progress of the project will be presented. After the presentation finished, the process continued with the fabrication of the design on week 9. The fabrication process takes time about 7 week to make a complete design of the portable and foldable clothes hanger.

The progress of the project continued with the report writing. This task starts from week 5. It take time about 10 weeks to finish the final project report. The last progress is the final presentation on week 14. All the task is scheduled for 14 weeks to complete the project.

CHAPTER 2

LITERATURE REVIEW

2.1 Introduction

Clothes hanger is used to dry the wet clothes by hanging the clothes on it. This clothes hanger was first invented in France and England in 1800. The first model of clothes hanger is using a rope that is tied on the trees. The clothes hanger nowadays comes in a wide variety of shapes, colour, height and materials depend on their origin, style and intended purpose. The clothes hanger can be freestanding, hanged or attached at wall. Some of the freestanding clothes hanger has wheel to make it easier to move. The other types of hanger can adjust the height according to user's comfortable. Others have high quality of material such as aluminium, plastics and stainless steel. Some clothes hanger is made as an art and has a high value. But nowadays, people are like to use the clothes hanger that is simple, light weight, portable and foldable.

2.2 Product Review

2.2.1 Proteam Single Clothes Hanger, Black and Chrome



Figure 2.1: Proteam single clothe hanger

The clothes hanger shown in the **figure 2.1** above is a simple design from the Proteam UK Ltd. This clothes hanger's height is adjustable and it is also portable. It is made as a simple and strong hanger and comes in a black and silver colour. The dimension of this product is height 94.5 – 166.5cm x width 81.5 cm x depth 44.5 cm.

2.2.2 Valet Double Clothes Hanger – Jeeves (Italy)



Figure 2.2: Valet double clothes hanger

The clothes hanger that shown **in figure 2.2** is made from high quality wood and has a high art value. This clothes hanger not only can used to hang clothes, but it is also a decoration accessory in our home. It has wheel so it is easy to move it. The dimension of this product is height 105.5cm x width 70.0 cm x depth 40.0 cm.

2.2.3 Mobile Wooden Clothes Hanger (UK)



Figure 2.3: Mobile wooden clothes hanger

The clothes hanger that shown in **figure 2.3** is also made of high quality wood. It is a simple clothes hanger and it's lower part can be used to put the shoes or other things. This is a product from UK. The dimension of this product is height 95.0cm x width 50.0 cm x depth 50.0 cm.

2.3 Process in fabrication

This chapter is 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.

2.3.1 Welding

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 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 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 or 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.

a) Basic theory of Metal Inert Gas (MIG) Welding

Gas metal arc welding (GMAW), also known as metal inert gas or MIG welding, is a semi-automatic or automatic process that uses a continuous wire feed as an electrode and an inert or semi-inert gas mixture to protect the weld from contamination. As with SMAW, reasonable operator proficiency can be achieved with modest training. Since the electrode is continuous, welding speeds are greater for GMAW than for SMAW. The clotheshanger's lower part will be joined using this MIG welding process. **Figure 2.4** show the basic structure of the MIG welding.

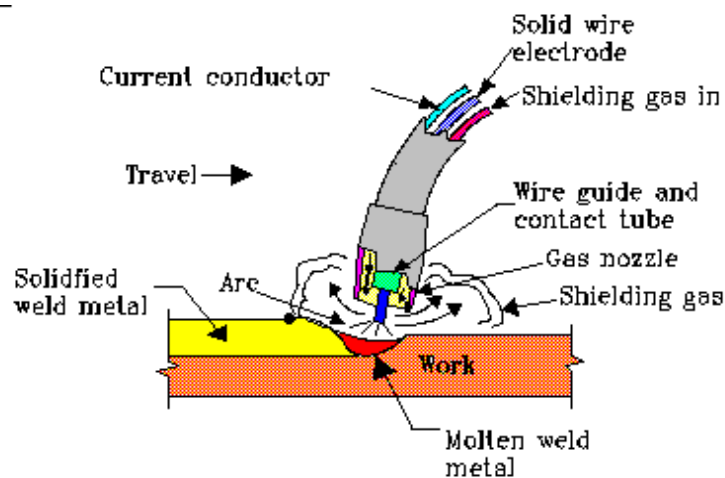


Figure 2.4: Basic structure of MIG welding

b) Welding Gun and Fire Unit

The **figure 2.5** below shows the basic structure on the nozzle of the MIG welding.

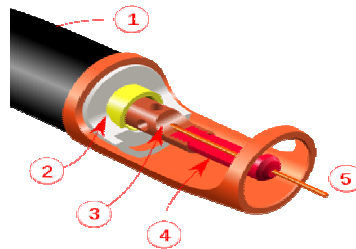


Figure 2.5: Basic structure of the nozzle

Figure 2.5: MIG torch nozzle cutaway image.

- (1) Torch handle
- (2) Molded phenolic dielectric (shown in white colour) and threaded metal nut insert (yellow)
- (3) Shielding gas nozzle
- (4) Contact tip
- (5) Nozzle output fac.

2.3.2 Band saw

A band saw uses a blade consisting of a band of too thed metal, and may be powered by wind, water, steam, electrical motor or animal power. The band rides on two wheels rotating in the same plane. Band saws can be used for woodworking, metal working, or for cutting a variety of other materials, and are particularly useful for cutting irregular shapes. The radius of a curve that can be cut on a particular saw is determined by the width of the band and its lateral flexibility. In this project, it is used to cut the raw material to the specific size that is needed.

2.3.3 Drilling

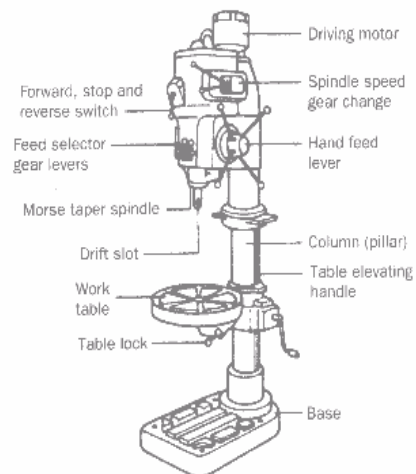


Figure 2.6: Drilling machine

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 constructions. 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).

Drilling is the process of using a drill bit in a drill to produce cylindrical holes in solid materials, such as wood or metal. Different tools and methods are used for drilling depending on the type of material, the size of the hole, the number of holes, and the time to complete the operation. This process used to make the holes to the body of the clothes hanger and the lower part to put the bolt and nuts.

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.

2.3.4 Bolt and Nuts



Figure 2.7: Bolt and nuts

Bolt is a headed and externally threaded fastener designed to be assembled with a nut. Nuts is an internally threaded product intended for use on external or male screw threads such as a bolt or a stud for the purpose of tightening or assembling two or more components. After drilling and welding process are done, bolt and nuts are used to join the legs of this clothes hanger.

2.3.5 Grinding / Finishing



Figure 2.8: Grinding machine

A grinding machine is a machine tool used for producing very fine finishes or making very light cuts, using an abrasive wheel as the cutting device. This wheel can be made up of various sizes and types of stones, diamonds or of inorganic materials.

The grinding machine consists of a power driven grinding wheel spinning at the required speed (which is determined by the wheel's diameter and manufacturer's rating, usually by a formula) and a bed with a fixture to guide and hold the work-piece. The grinding head can be controlled to travel across a fixed work piece or the workpiece can be moved whilst the grind head stays in a fixed position. Very fine control of the grinding head or tables position is possible using a vernier calibrated hand wheel, or using the features of NC or CNC controls.

Grinding machines remove material from the workpiece by abrasion, which can generate substantial amounts of heat they therefore incorporate a coolant to cool the workpiece so that it does not overheat and go outside its tolerance. The coolant also benefits the machinist as the heat generated may

cause burns in some cases. In very high-precision grinding machines (most cylindrical and surface grinders) the final grinding stages are usually set up so that they remove about 2/10000mm (less than 1/100000 in) per pass - this generates so little heat that even with no coolant, the temperature rise is negligible.

2.3.6 Painting

The last process is painting process. Painting purpose is to make the product look more attractive and beautiful. Paint also can prevent the product from corrosion. The purpose of is also to cover the scratch on the product. For this clothes hanger, the colour of paint those chosen are flat black and silver. The whole body and legs of the clothes hanger is painted in silver and the joint between the body and legs and the upper body is black painted.



Figure 2.9: Spray paint

CHAPTER 3

PROJECT METHODOLOGY

3.1 Project Flow Chart

In fabrication of The Wet Clothes Hanger, there is a planning of the overall progress to assure the project can be finish on schedule.

From the flow chart below, this project started with the literature review and research about the title. The main important of the project is determination the objective. Then, study, make investigation and gather information about the existing hanger in the market. These tasks have been done through research on the internet, books and others sources.

Then, after the information has been collected and gathered, the project will be continuing with the design process. In this stage, the knowledge and lessons that have studied will be applied in sketching. It is important to make a suitable design for the project. After several design sketched, design consideration have been made and one of the design have been chosen. The selected sketch will be transfer to solid modelling and engineering drawing by using Solidworks software.

After all the engineering drawing finished, the drawing was used as a reference for the next process, which it is fabrication stage. This process is consists fabricate all the parts that have design before by following all the dimension using various type of manufacturing process. The manufacturing process included in this process is welding, cutting, drilling and others. During the fabrication process, if there is something wrong occur, such as not balance dimension so the process will be stop and go back to previous step, make a modification against.

Analysis stage has been implementing after fabrication stage. If the clothes hanger is working and fullfill all the criteria, then this project are declared success.

Then, all the process mentioned above is done; all the material for report writing is gathered. The report writing process will be guided by the UMP final year project report writing. This process also, preparation for presentation slides for the final presentation for this project.

The project ended after the submission of the report and the slide presentation has been present.

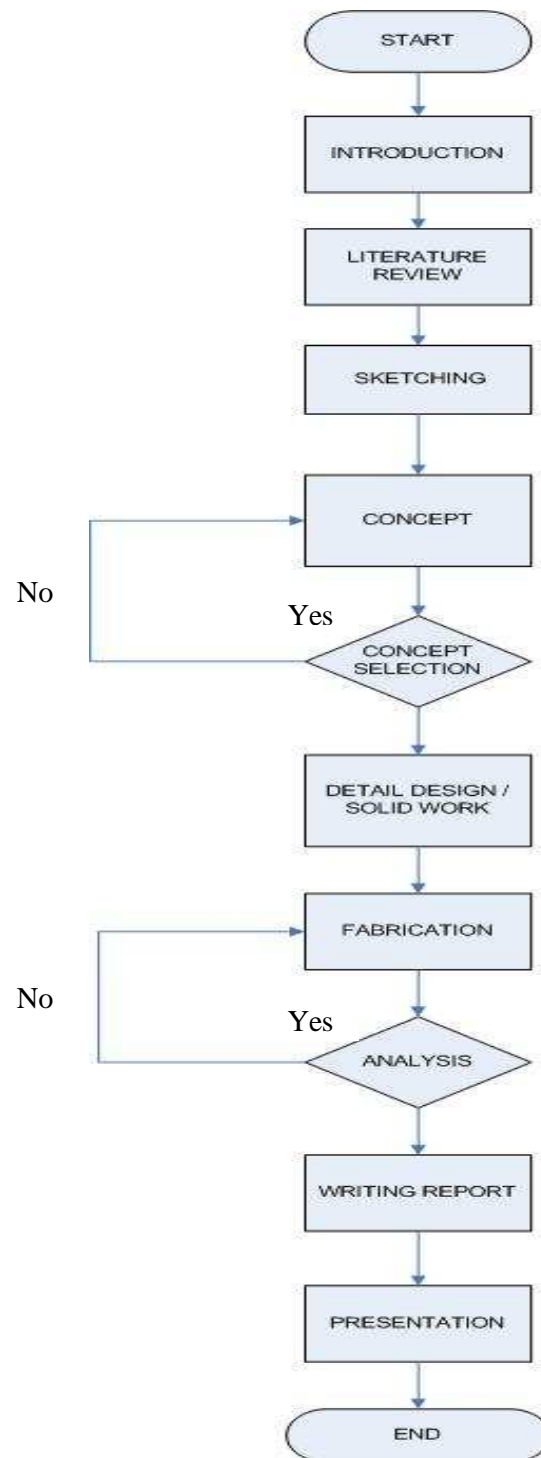


Figure 3.1: Project Flow Chart

3.2 Design

The design consideration must be done carefully and efficiency 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 3 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. The design of the portable and foldable wet clothes hanger must be compliance to the several aspects and criteria. The aspects that must considered in designing the clothes hanger are this design must be portable and foldable. It also must can easily moved and stored when not used. For the material aspect, the clothes hanger must strength enough to hang the wet clothes. The material also must corrosion resistance. The cost of the whole project must be reasonable and not exceed the budget given.

3.2.1 Concept A

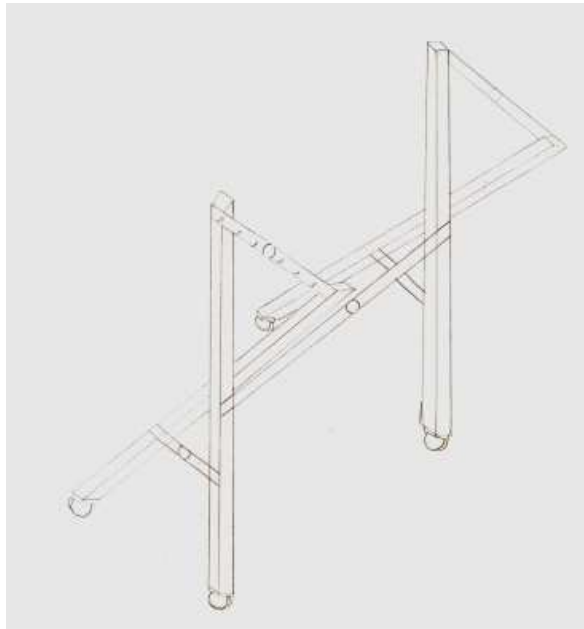


Figure 3.2

The advantages of this design are it has wheel, so it can easily moved. It also can be folded two times and can be stored when not used. The disadvantages are it is heavy and it is also a complex design. So not all people are able to use it (such as children).

3.2.2 Concept B

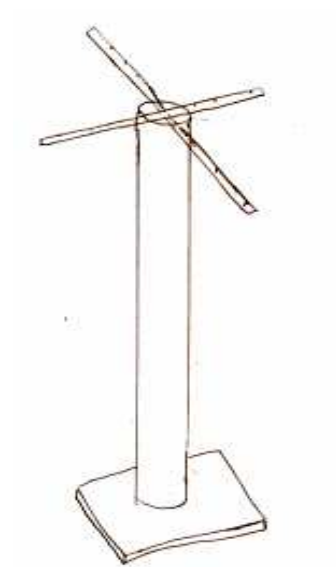


Figure 3.3

The advantages of this concept are it is a simple design and only need a small place to stored. It also made from material that has light weight. The disadvantages are the lower part cannot be separated and this clothes hanger cannot be folded.

3.2.3 Concept C

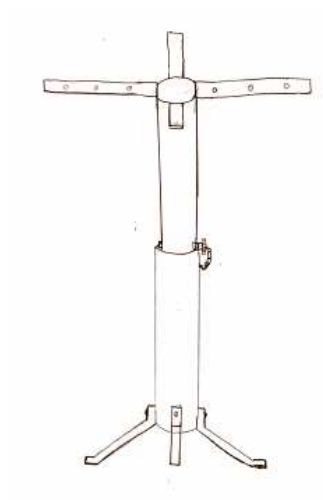


Figure 3.4

The advantages of this design are it is a simple design and the upper part can be removed. The height of this design is adjustable. The disadvantages are the lower part cannot be separated.

3.2.4 Results

From the design sketch, one of the best designs will be selected. It can be evaluated through several section criteria for its functions. The first criteria are customer needs. It is important to know what customers want about this product. It is easier when a product enters the market. People nowadays need a clothes hanger that is portable and foldable. Next selection criteria are easy to use.

Beside that, easy to manufacture also be an important criteria to select the design. It includes 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 enters a market, costing is very important to attract customer to buy it. Lastly the selection criterion is the strength of the product. This criterion can be known through the analysis.

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

3.2.4 Finalize Design

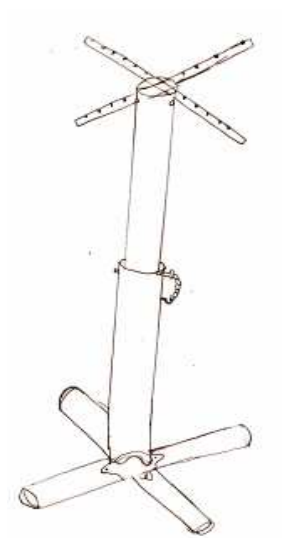


Figure 3.5

After several design consideration conducted, this is the new design. This design should achieve the objectives such as it must be portable, foldable, height is adjustable and made from light weight material.

3.3 Concept Generation and Evaluation

Three concepts for the clothes hanger were developed. These are evaluated against the datum of standard clothes hanger with the Pugh Concept Selection.

Table 3.1: Pugh concept selection

Criteria	Concept 1	Concept 2	Concept 3	XXX product
Portable	-	+	+	+
1x Foldable	+	+	+	+
2x Foldable	+	-	-	+
Hanger	-	+	+	+
Light Weight	+	+	-	+
Wheels	+	-	-	+
Ease to handling	+	-	+	+
Ease to use	-	-	+	+
Material used	+	-	+	+
Material cost	-	-	+	+
Strength	+	-	+	+
Efficiency	-	-	+	+
PLUSSES	7	4	9	
MINUSSES	5	8	3	
NET	2	-4	6	
RANK	2	3	1	
CONTINUES	NO	NO	YES	

3.4 The Engineering Drawing

The drawings are divided into two categories, which are:

- i. Sketching – all the ideas for the recycle bin fabrication are sketched on the paper first to ensure that idea selection is good or not.
- ii. CAD software – the selected design or concept sketched is transfer to solid modeling and engineering drawing using Solidworks software.

Then the design will converted to the orthographic view to get the engineering drawing details. (refer to **Figure 3.6**)



Figure 3.6: Solidwork drawing

3.5 Fabrication Process

The fabrication process is start with cutting the material using the band saw to the size needed. Then the material are grind using grinding machine to get a smooth surface. (refer **figure 3.7** and **3.8**)



Figure 3.7: Band saw



Figure 3.8: Cutting process

The process continued with drilling the holes by using the drill machine (refer to **figure 3.9**). After drilled, the material is grind once again to get a smooth and curve end.



Figure 3.9: Drilling process

The fabrication process continues with joining the material using MIG welding (refer to **figure 3.10**). The output voltage must be set up first to get a good joint.



Figure 3.10: Welding Process

The second last process is joining the folded part using bolt and nuts. The bolt and nuts are put at the places that has been drilled (refer **figure 3.11**).



Figure 3.11: Bolt and nuts

The last process on this fabrication is painting the product. The purpose of painting is to make the product look more attractive and also to avoid the corrosion. (refer **figure 3.12**)



Figure 3.12: Painting process

CHAPTER 4

RESULT AND DISCUSSION

4.1 Introduction

This chapter is focus on the analysis of the project. It includes the completed fabrication, product specification, and the causes of the problem of the project. The analysis will help to improve the quality of the clothes hanger.

4.2 Result

After completed the fabrication process, the product had gone trough the analysis process. At this stage, all information about the product is listed. It is important to classify the product before it enters the market. The clothes hanger that have been fabricate completely is shown below in **figure 4.1** until **figure 4.3**.

This is the picture of the clothes hanger when it is used to hang the wet clothes.

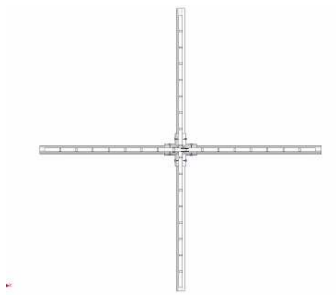


Figure 4.1

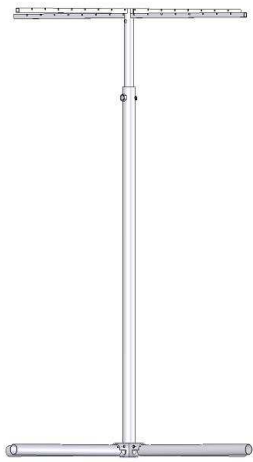
The picture below shows the clothes hanger when it is unused. The upper part are separated from the body, the body are adjusted to the minimum height and the lower part are folded. It makes the clothes hanger is smaller than the original size and make very easy to portable.



Figure 4.2



Top view



Front view



Side view

Figure 4.3: Orthographic Drawing

4.2.1 Product Specification

This is the analysis of the product at its specifications. The product is classified to several categories such as colour, wide, length and height. The product specifications are shown below in **table 4.1**.

Table 4.1: Product specifications

Category	Results
Length	1.0 metre
Height	1.0-1.5 metre
Colour	Black and Silver
Weight	1 kg
Wide (diameter)	0.03 and 0.04 metre
Other specifications	Can be separate into two parts and be fold

4.3 Discussion

4.3.1 Introduction

Discussion was divided by two parts. Firstly the discussion about type of defect on the final product .Secondly, about the problem in progress start with literature reviews until fabricate and finish this product.

After finished fabrication process, the product has been analyzed and many types of defects identified. It happens during the fabrication process and caused by lack of skills to operate using several machine and tools. The types of defects are shown below.

4.3.2 Bead

Figure 4.4 is the example of defect in welding process. The bead occurs when the voltage and the wire speed while during welding process is not match. Insufficient experience to handle also causes the bead.

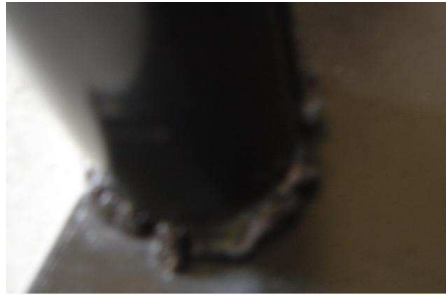


Figure 4.4

4.3.3 Legs not parallel

The legs of this clothes hanger cannot fold properly. Figure 4.5 shows the legs of the clothes hanger when it is folded. One of the legs is not parallel to the others. This happened because the size of the legs is not cut same.



Figure 4.5

4.3.4 Problem in progress

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 main problem in making design is to design a product that fullfill all the objective. Many drawing are designed, and the best design that achieve all the objectives are selected. 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 following project planning schedule. First, the problem is to find material that suitable for the title of the project .The suggestion material to produce the clothes hanger is not available at the store. After make discussion with the supervisor, material for this project is gathered at the hardware shop.

The problem also come during fabrication process, mainly is difficult to fabricate the material with the design was changed on week 9. Problem also encountered when to weld the body and the lower part because gas for MIG welding was finished and waited for two weeks to get new gas for MIG welding.

CHAPTER 5

CONCLUSION AND FUTURE RECOMMENDATION

5.1 Introduction

For the final chapter it present about conclusion and recommendation for the project. Summary is established to conclude the whole final year project. The problem were included the process planning that have been done. However there were problems faced during the course of this project. Therefore a more complete understanding and enhanced application steps can be attained. 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.

5.2 Suggestion for Future Work

5.2.1 Material

Many types of material can be used to fabricate this clothes hanger such as plastics, wood, steel and so on. But, the quality, weight and the strength of the material should be considered. So, the aluminium is the material the suitable for to make this clothes hanger.

5.2.2 Shape

This clothes hanger should have a small and simple shape. It also must have shape that is easy to folded and portable. It must look more creative and have aesthetic value.

5.2.3 Function

The clothes hanger will become more useful if it is not only used to dry clothes but also have other purpose such as place to put shoes.

5.2.4 Future Work (Recommendation)

As the conclusion, overall progress of the project was good. Due to some problems, this project sometimes was done late from the schedule but it still finish on time. If more time were given, the portable and foldable wet clothes hanger will be made more creatively and have multifunction use. Maybe it will have place to put the shoes and the appearance will be more attractive.

5.2.5 Conclusion of the Project

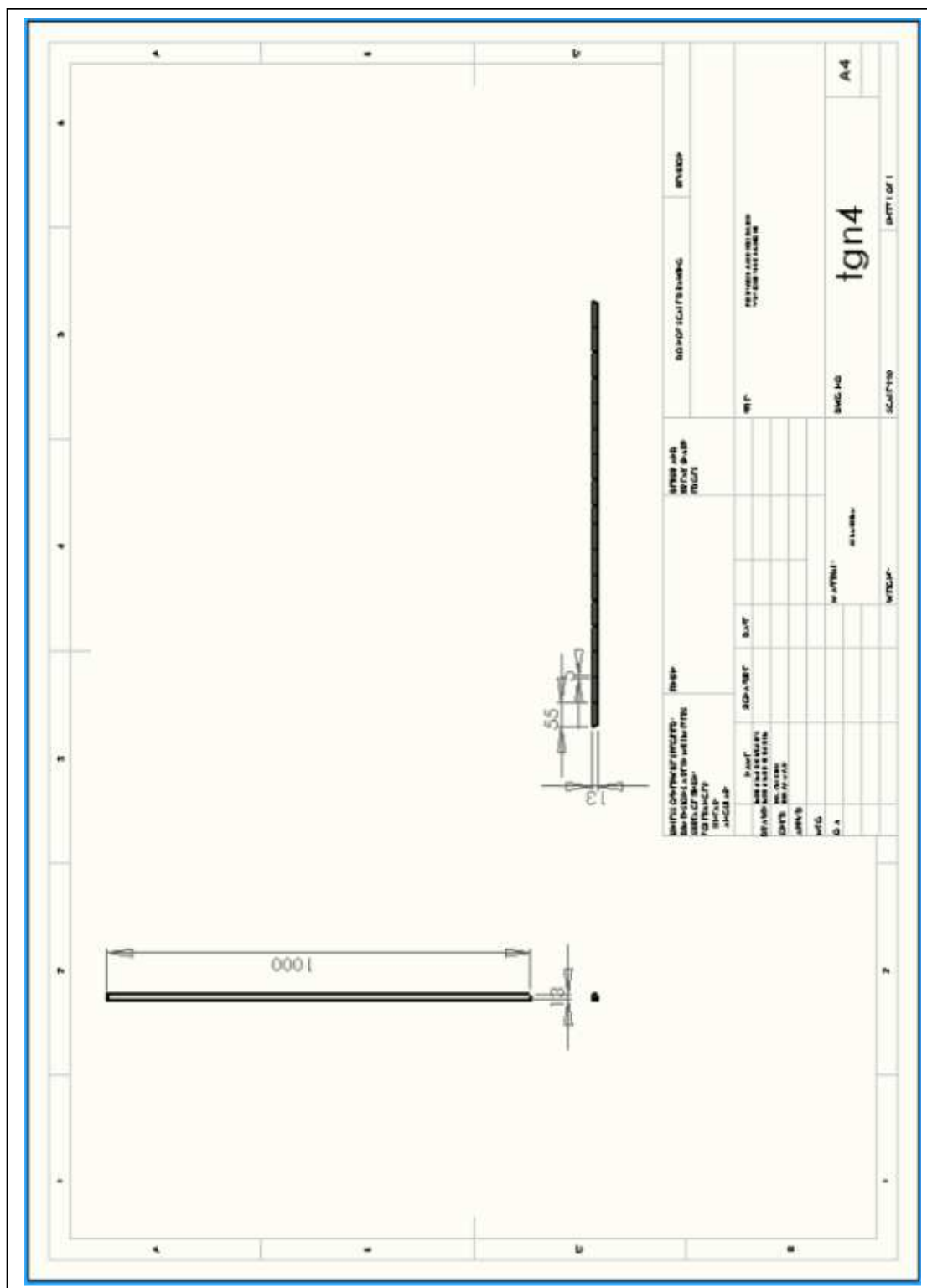
The conclusion for this project is based on the result of the product that have done. The result that has done is very satisfied and has been done based on project planning. The result of product also has finish according to the drawing dimension that has been making before. From this project also teaches how to understand so many things especially learned how to design a product that is beneficial and learned this subject practically. Besides that the most important is to make a detail drawing so that the fabrication can run smoothly.

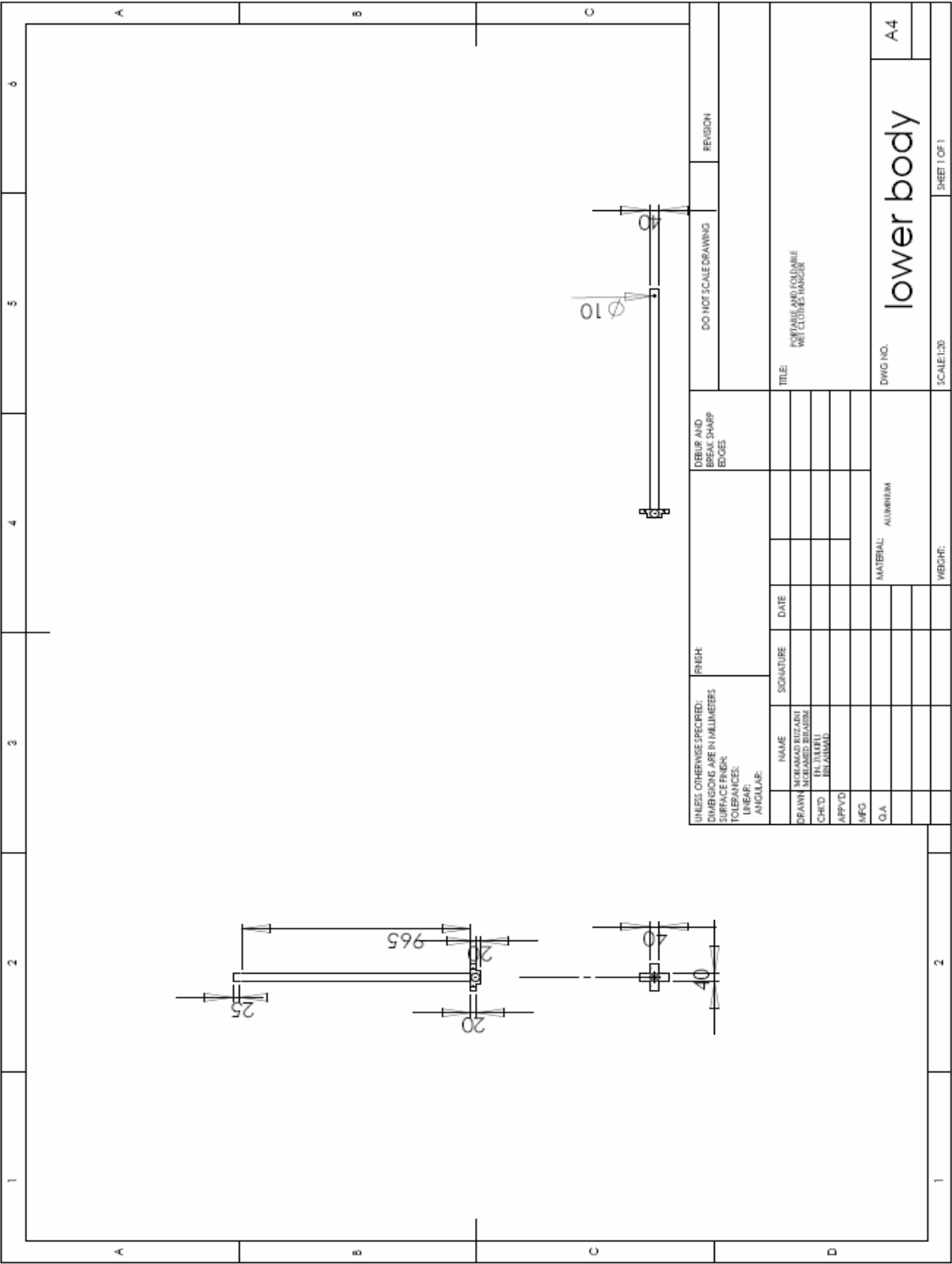
The project had achieves most of the objectives but some are not achieved due to several problems. Project management is very important to make sure the project is done smoothly without any problem and achieve the entire objective. If more time and good budget is given the project will be done more smoothly and creatively.

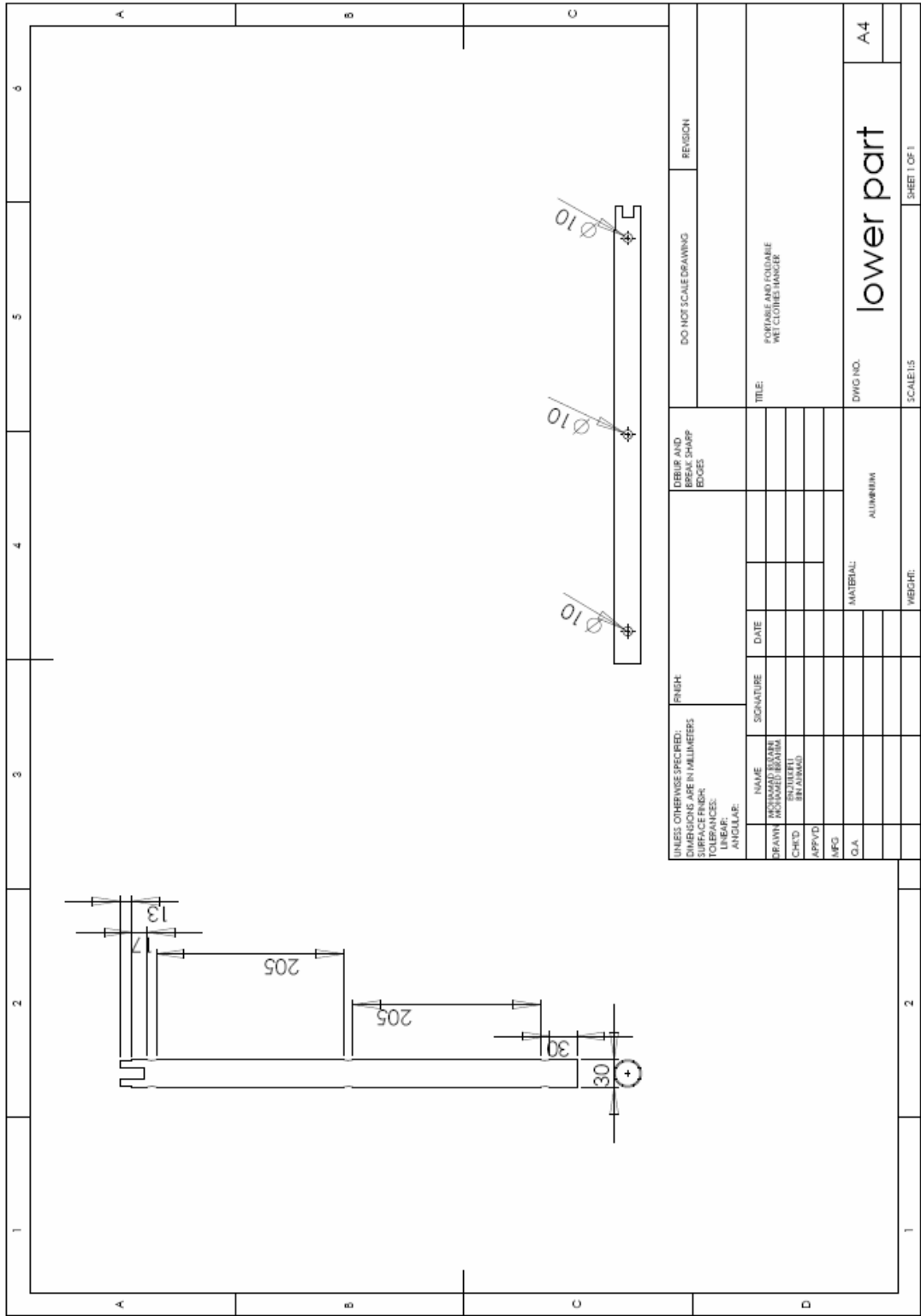
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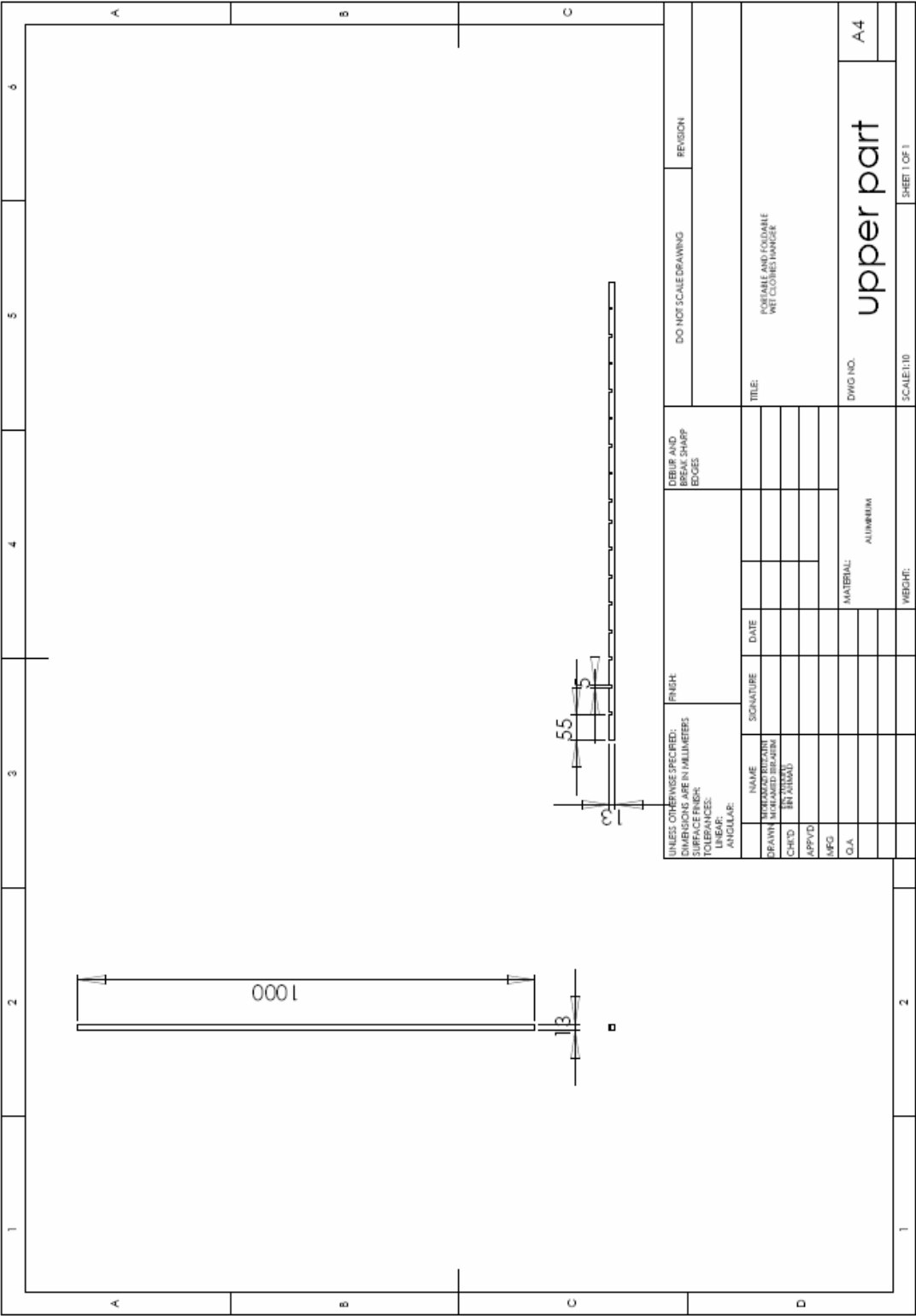
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7. <http://en.wikipedia.org/wiki/punching.htm>

APPENDIX A









UNLESS OTHERWISE SPECIFIED: DIMENSIONS ARE IN MILLIMETERS				FINISH: SURFACE FINISH: TOLERANCES: LINEAR: ANGULAR:		DEBUR AND BREAK SHARP EDGES		DO NOT SCALE DRAWING		REVISION	
NAME	SIGNATURE	DATE									
DRAWN: MICHAEL BRADY											
CHECKED: J. J. J. J.											
APPROVED:											
MFG:											
Q.A.											
				MATERIAL: ALUMINUM				DWG NO.		upper part	
										A4	
								SCALE: 1:10		SHEET 1 OF 1	
				WEIGHT:							

APPENDIX B

MACHINE TOOL AND EQUIPMENT



MIG Welding Machine



Abrasive Cutter



Measuring Tape



Hand Grinding



Personal Protection Equipment (PPE): Visor, Goggle, Glove & Apron



Hand Drill



Rivet Pop