DESIGN AND FABRICATE WELDING MACHINE CART

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CHAPTER 1

INTRODUCTION

For this chapter, it is about discussion of the project background, problem statement, objective of the project, and lastly scope of the project.

1.1 PROJECT SYNOPSIS

In this project, the development of a welding machine cart so that the welding machine can be moved from one place to another. The design of the welding cart is more focus on placing the welding machine and the gas cylinder plus providing mobility ability to the cart.

1.2 PROJECT BACKGROUND

This project is to understand the fundamental of designing and fabricating a gas base welding machine cart for the use of welders in welding process by adding a mobility capability to the machine.

The cart has three major compartments which are two for the place of the welding machine and the other one is for gas tank compartment. The cart will also has place for the wire to be hanged so that it does not look muddled which will make things easier for the welders during the process or moving it to another place.

The welding cart is to be able to support the weight of the welding machine**.** This project is to design a perfectly match the size of the welding machine and the gas tank. The design of this project is generate the concept generation process continued with finalizing the design. After the final design is decided then the fabrication is done as the material selection is decided with the supervisor.

The idea of the project is based from problem statement and focusing on the scope that is needed for the improvement of the cart.

1.3 PROBLEM STATEMENT

A Welder frequently found himself in hard position in the welding process caused by the immobility of the welding machine and the equipment for the welding process. The problem with the tools is that they are not arranged in perfectly order and they often be found in many places in the workshop which is messy plus causing a delay in the fabrication process.

1.4 OBJECTIVE OF THE PROJECT

To developed and fabricate a welding equipment cart for mobility of the welding equipment and safety gear and also additional tool required during a welding process.

1.5 THE SCOPE OF THE PROJECT

The welding cart is more focused on Gas base welding machine with a gas tank as one of its component and its equipment which are many and not in appropriate order in the workshop or workplace.

1.6 PROJECT PLANNING

The first thing to in this project, a meeting with supervisor in the first week is done to fare the schedule of weekly meetings. The purpose is to update the supervisor on the progress of the project and guided by the supervisor to solve difficulty.

Briefing based on the introduction and next task of the project is given by supervisor. Make research of literature review with the means of

the internet, books, available published articles and materials that is related to the title.

The designing phase starts by sketching three models of the welding cart using manual sketch on A4 papers. Do the comparison between three and come out with the best concept design. The fourth design is drawn in software applications which helps to draw a better dimension downloaded from internet which is Software Solid Work.

Next is the preparation of mid-presentation of the project. Before presenting, the supervisor will see through the slide presentations and comment on corrections to be made. Then, presentation on the knowledge attained and instilled in the design phase is presented to a panel of three judges.

Following up, is the fabrication of make some method for this project. The material is decided plus with a list of the material and dimension. The planning of fabrication process for the project is done.

After that, the fabrication process is proceed. It would take seven weeks to get this design and fabrication process alteration done. A few analysis and testing of the welding cart are done plus the correction of the error. Finish the fabrication process with painting process.

After that, the final report writing and final presentation will be the last task to be accomplished. The supervisor will review the final presentation and revise mistakes to be amended. The final presentation then again will be presented to three panels. A draft report would then be submitted to the supervisor to be point out the flaws. Corrections are done and the real final report is handed over as a completion of the final year project.

1.7 GANTT CHART

Based from the Gantt chart on table 1.7, the project starts with the title distribution and briefing with the supervisor which actually happened in week two due to some technical issues with the place timing of the meeting.

Week 2, proceed with the literature review for information collecting followed by methodology in week 3. Then concept generation, deciding the final concept, initial presentation and final presentation that succeedly met on respective week.

The fabrication process finished three weeks late than planned due to not enough tool and material causing the functioning test to be done two weeks late. Then project is continued with the report writing after the project is proved functioning. Finally the final presentation to show the complete work done for this project.

Table 1.7: Gantt chart

TASK	WEEK	1	2	3	4	5	6	7	8	9	10	11	12	13	14
Title/Briefing by Supervisor	Planning														
	actual														
Literature Review	Planning														
	actual														
Methodology	Planning														
	actual														
Concept generation	Planning														
	actual														
Final Concept	Planning														
	actual														
Initial presentation	Planning														
	actual														
Material Selection	Planning														
	actual														
Fabrication	Planning														
	actual														
Functioning Test	Planning														
	actual														
Report Project	Planning														
	actual														
Final Presentation	Planning														
	actual														

1.8 CHAPTER CONCLUSION.

Every project needs objectives; scope, problem statement and also planning so that the project can be proceed successfully. Therefore, these criteria are successfully determined and the next step of the project can be proceed.

1.9 THESIS ORGANIZATION.

Chapter 1 provides the necessary intro to start a project. A project needs to have its own simple synopsis to provide a clear introduction to the project. The back ground of the project also covered as

it plays an important role knowing the more about the project. This chapter also provides the necessary objective as to set it as the target on what this project will consume to. A problem statement also mentioned as it will determine that this project is developed to solve problems that commonly occur to the target people. Scopes are given to make it more specific. Finally the planning of the project, a project is needed to be planned so that it can be done accordingly as following the planned. A Gantt chart to planned the duration of the project so that the time limit of the project can be set.

Chapter 2 is about collecting information to be used for the project. The information is collected by many references such as internet, magazines, new paper and many other source of information. This chapter mostly based on the easiest source of information which is the internet. The information regarding this project is collected from either previous project or the product available on the market as this project is based on the products that are available in the market. Then the information is then be view as to generate new ideas for the production a new product which can be practically used based on the market.

Chapter 3 is about producing new ideas for the fabrication of a new product so that it can be used. Flow chart is constructed to get a clear view on the flow of this project. Three ideas are to be generated and the ideas generated mostly based on the information that has been collected during the chapter 2. Then, evaluation is made to determine between the three ideas to choose the best design for the fabrication. Several traits or characteristic is made up and the by evaluating between the three design, the ideas which meets all the traits is considered as the most ideal design for the fabrication.

Chapter 4 provides the information on the fabrication process which has been used for producing the new product which the design is decided during the chapter 3. This chapter will show the phase of the fabrications and the processes that will be going through to produce the product. This chapter also tells about the material selection where the dimension is shown to list down the types of materials that has been used for the project. Finally, this chapter will show the finished product as to state that the fabrication process is finished.

Chapter 5 tells about the discussion made up to view the problems occur during the production of this project. The problem encounter will act as the reference for the next project. This chapter also provides the discussion about the functioning of the product that has been produce to get how the product works and prove that the product is functioning.

Chapter 6 is about the conclusion that can be made through out this entire project. The conclusion covers on what have been learn through this product or project. Recommendation also provided so that any new idea will have the reference thus problems can be avoided.

CHAPTER 2

LITERATURE REVIEW

The title development of welding machine cart requires an amount of good understanding on the knowledge of the science. Therefore, executing a research is necessary to obtain all the information available and related to the topic. The information or literature reviews obtained are essentially valuable to assist in the construction and specification of this final year project. With this grounds established, the project can proceed with guidance and assertiveness in achieving the target mark.

2.1 TERMINOLOGY

Welding is a materials joining process meaning two or more parts are coalesced at their contacting surfaces by suitable application of heat and or pressure. Welding provide permanent joint and the joint strength is typically as high as strength as base metals.

The major disadvantage of welding is that it usually performed manually so the cost for labor is high. Welding machine comes with a big size which makes it impossible to do the welding with bringing the work piece closer to the welding machine to do the welding process. The implication is the immobility of the welding machine will slow down the welding process.

Therefore, to overcome this disadvantage, welding machine cart is created so that the laboring will become easier and reduced. This is because the welding cart will make things easier for the welders to do the

welding even though it involves various place and distance as the welding machine is equipped with mobility ability.

2.2 TYPES OF WELDING MACHINE CART.

2.2.1 UWC1 – UNIVERSAL WELDING CART

FIGURE 2.1: UWC1 – UNIVERSAL WELDING CART 1.

SOURCE: ranger-forums.com

The UWC1 is designed to make the maneuvering your welder easy. It has 50kg of capacity. It comes with an overall dimension of 81 cm × 41 cm × 50 cm. The shipping weight of the product is 11.33 kg. This product is steel construction with power coat finish.

The advantages of this product are the single gas tank rack is capable of holding up to a 19.05 cm diameter, 36.29 kg cylinder and comes with a securement chain to hold the gas tank in place. The slanted top shelf accommodates most brands of welding equipment and places the welder controls at an easy to use angle.

The disadvantage of this product is that it can only hold a small gas tank causing a limited time of used the welding machine. This also can cost a lot of money for changing the gas tank. These carts also do not have a handle causing a slight of difficulty for maneuvering to a big distance.

2.2.2 TTWC – THREE – TIER WELDING CART

FIGURE 2.2: TTWC – THREE – TIER WELDING CART

SOURCE: hobartwelders.com

The Three – tier welding cart comes with 50 kg capacity with an overall dimension of 69.85 cm × 41.18 cm × 73.025 cm. It has a shipping weight of 14.06 kg. These welding machines cart also a steel construction with power coat finish.

The advantages of this welding machine cart are welders control is put at a comfortable working height and has storage shelves for all your tools and accessories. The gas tank rack is capable of holding up to a 16.51cm diameter cylinder and comes with two securement chains to hold the cylinder in place. The slanted top shelf accommodates most brands of welding equipment and places the welder controls at an easy to use angle.

The disadvantages of this welding machine cart are it does not have handle for the welder to hold and make it easier for the maneuvering of the welding cart. This condition can put the welder a dangerous situation where the welding machine might fall during the maneuvering of the cart.

2.2.3 UWC2 – UNIVERSAL WELDING CART 2.

FIGURE 2.3: UWC2 – UNIVERSAL WELDING CART 2

SOURCE: weldingweb.com

The UWC2 is a welding machine cart for welding process that comes with 50kg capacity and an overall dimension of 82.04 cm × 46.48 cm × 75.44 cm. This welding machine cart also has a shipping weight of 14.51kg plus it is a steel construction with coat finish.

The advantages of the welding machine cart are the single cylinder gas tank rack is capable of holding up to a 19.05 cm diameter, 36.29 kg cylinder and comes with a securement chain to hold the cylinder gas tank in place. The slanted top shelf accommodates most brands of welding equipment and places the welder control at an easy to use angle. This cart comes with a new fold handle. The used of the handle is to easily move

your welding equipment in to place the fold down the handle for the easy access to welder controls. The wrap around cable holders help keep your cables organized.

The disadvantage of this welding machine cart is that only small size cylinder can be place on the cart even though the amount is two. The cart is not stable and might fall it is moved.

2.3 CHAPTER CONCLUSION.

The conclusion for this chapter is that all the information plans for continuing this project has been collected and it is found that the information that has been collected play an important role and will highly contribute to the process in the chapter two which will be the phase of producing a different product from the current one thus the will project will running smoothly.

CHAPTER 3

METHODOLOGY

In designing and fabricating the welding machine cart, a flow of methods was needed to be used for the designing. First of all, a process planning had to be charted out. This will act as a guideline to be followed accordingly so that, the final model sees the requirement and time could be fared. This would determine the efficiency of the project to be done. Regulating and analyzing these steps are very important as each of the steps has its own criteria to be followed.

3.1 FLOW CHART

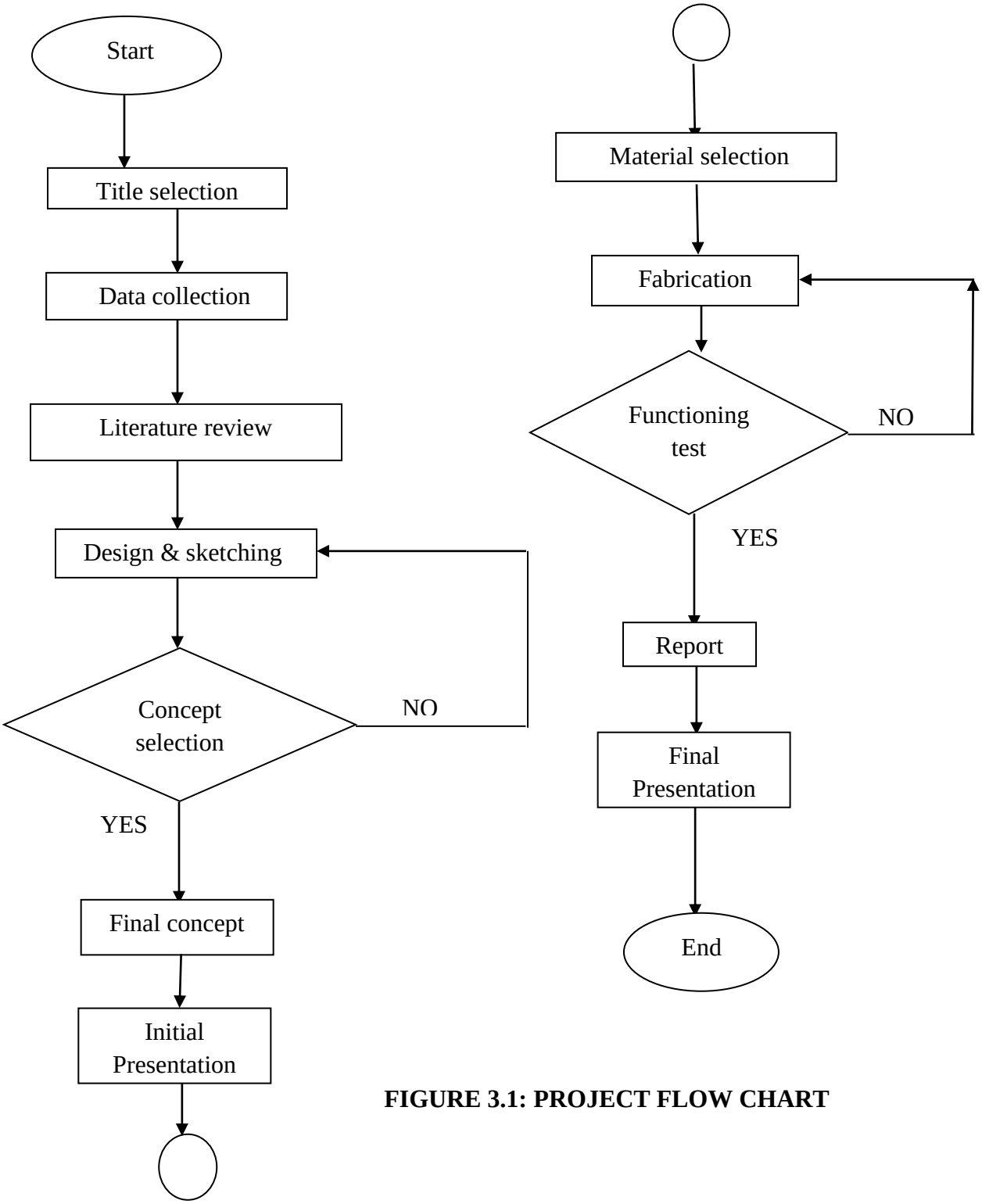

FIGURE 3.1: PROJECT FLOW CHART

From the flow chart above, this project started with the literature review and research about the title. Then, study and make a lot of investigation about multipurpose desk. This includes a study about concept of multipurpose desk, process to fabricate, and material. These tasks have been done through study on the internet, books and other sources.

The information gathered and the project is continued with the design process. It is important to make a suitable design for the project. After several design sketched, design consideration have been chosen.

After all the engineering drawing finished, the drawing has been used as a reference for the next process, which is fabrication stage. This process will consist of fabrication to all parts that have been designed by follow the dimension using various type of manufacturing process. The manufacturing processes include in this process are welding, cutting, drilling, bending and others. During the fabrication process, if there is something wrong occur, such as not balance dimension or the chassis was broken so the process will be stop and go back to previous step, make a modification against.

Evaluation stage has been implemented after fabrication stage. The evaluation is by considering the strength, durability, safety and workability of the desk. During the evaluation, if problem occur such as malfunction, modification will be done.

Then, after all the processes mentioned above are done, all materials for report writing are gathered. The report writing process will be guided by the UMP final year project report writing. Preparation for final presentation is also being made by finished the slide show. The project ended after the presentation and submission of the report.

3.2 DRAWING / SKETCHING AND DRAWING SELECTION.

The drawings are divided in two categories, which are:

- Sketching: all the ideas for the welding machine cart are sketched on the paper to ensure that three main ideas can be selected after the design is chosen.
- Solid Works application: the design or concept sketched is transfer to solid modeling and drawing using Solid Work Application.

From the three main ideas, evaluation is made to choose the best ideas and selected as the final design, the three main ideas are:

3.1 Concept 1

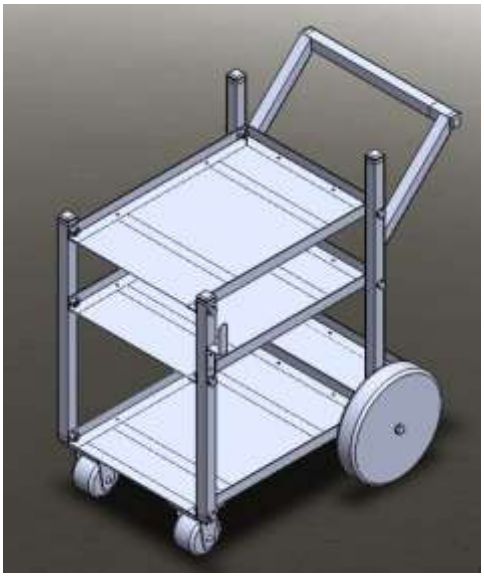

FIGURE 3.1: concept 1

Figure 3.1 shows the first concept design for this project. Based from this concept there are two ball bearing wheels in the front from the

maneuvering and two big wheels at the back to support the weight of the cylinder plus the welding machine.

Table 3.1 shows the advantage and disadvantage of concept design 1.

Table 3.1: advantage & disadvantage

advantages	disadvantages
- stable - easy maneuvering	- Handle strength low.

3.2 Concept 2

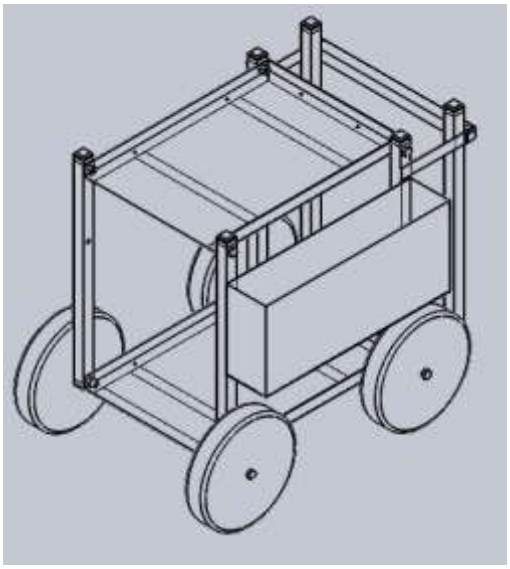

FIGURE 3.2: concept 2

Figure 3.2 shows the second concept consists of three parts which are the upper part, the lower part and compartment box. The welding machine cart is supported by four wheels which made it more stable than the other design.

Table 3.2 shows the advantage and disadvantage of concept design 2.

Table 3.2: advantage & disadvantage

advantages	disadvantages
- enough space for safety compartment - Stable.	- Difficult maneuvering. - No handle.

3.3 Concept 3

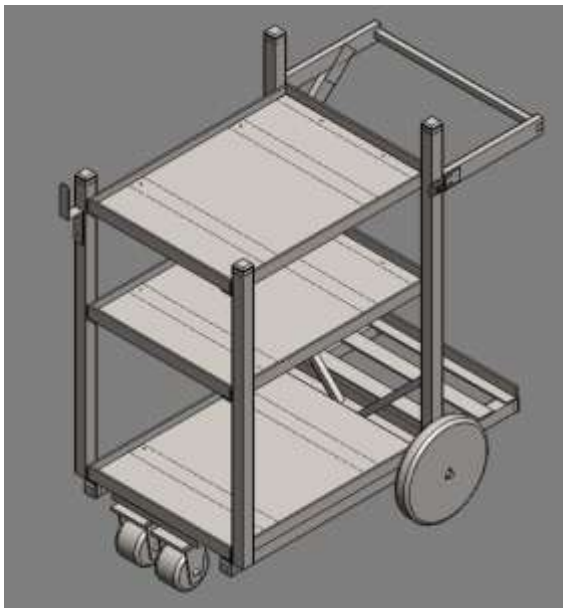

FIGURE 3.3: concept 3

Figure 3.3 shows the third concept that has been developed. This concept shows the major difference in the position and types of wheel on the front compared to concept 1 and concept 2. This difference is show the maneuvering trait of the welding machine cart.

Table 3.3 shows the advantage and disadvantage of concept design 3.

Table 3.3: advantage & disadvantage

advantages	disadvantages
- Easy maneuvering - Stable - Joint handle	- Less secure of securement of the cylinder.

3.3 CONCEPT EVALUATIONS

Table 3.3 shows the evaluation of the three concept of the design of the welding machine cart. This evaluation is made to determine the final design for the fabrication process. The characteristic of each design is to consider determining which design meets the characteristic needed for the final design to be proceeding with the fabrication process.

Based on the table3.3, it shows that concept design 3 meets the entire characteristic needed for the final design. It has the character of ease maneuvering, safety gear and tools compartment, firm handle, stable, weight support and durable.

Table 3.3: concept evaluations

Bill	Characteristics	Concepts		
		1	2	**3**
1	The ease of maneuvering	**/**		**/**
2	Safety gear and tools compartment			/
3	Firm Handle	/	/	**/**
4	stability			**/**
5	Weight support			/
6	durability			**/**

3.4 CHAPTER CONCLUSION

The design for the fabrication has been selected and choosing the third concept as the final concept. The concept is chosen as it met all the characters in need for the final product. Thus the fabrication process can be continued.

CHAPTER 4

FABRICATION PROCESS

This chapter will cover the fabrication process including the material selection and also the phase involves during this process. This process will start with the material selection and follow by other process such as measuring, cutting, welding or joining and many more that is necessary for the product to be produced.

4.1 MATERIAL SELECTION.

Material selection is done by considering the availability of the raw material that can be supported by the faculty. Material chosen will determine either the product produce is quality or not.

For this project mostly mild steel is used due to availability of the material, the strength and the ease to work with meaning is not too hard and also too difficult to handle.

Table 4.1 shows the list of material needed for the fabrication process. From the table, three types of materials is used which are the mild steel, stainless steel, and galvanized iron. Mostly the material used for the body of the cart is mild steel.

Table 4.1: list of material

Type of steel	length	Quantity
Flat bar [mild steel]	500mm×38mm×6mm	8
Hollow square bar [mild steel]	900mm×38mm×38mm	2
	750mm×38mm×38mm	2
	400mm×38mm×38mm	2
	500mm×38mm×38mm	1
	1000mm×38mm×38mm	2
Angle bar [mild steel]	200mm×38mm×38mm	2
	500mm×38mm×38mm	7
	700mm×38mm×38mm	6
Bolts and nut m8	(diameter 8mm)	8
Sheet metal [galvanized iron]	500mm×750mm×2mm	3
Hollow square [stainless steel]	500mm×38mm×38mm	1

Figure 4.1: raw material

Figure 4.1 shows the raw materials that are taken from the faculty's store for the use in fabricating the welding machine cart.

4.2 FABRICATION PROCESS AND THE PHASE.

The fabrication process is the final process of the project where the design selected is used and be made actually to be produced. This process is divided in to four major phases which are measuring, cutting, joining, and finishing. In each phase comes with the process and the tools in the process.

4.2.1 Measuring process

Figure 4.2: measuring process

Figure 4.2 shows the measuring process that has been done mostly using the measuring tape. This process is to measure for the cutting of the raw material to respective measurement for the cutting.

4.2.2 Cutting process

Figure 4.2: cutting process

Figure 4.2: cutting process shows the cutting process that has been done to cut the material for the making of the body of the welding cart. The machine used based on the figure is hack saw and cutting machine.

4.2.3 Joining process.

The joining processes come with several types of joining which are welding, riveting and drilling for the nuts and bolts.

Figure 4.2: drilling process

Figure 4.2: drilling process shows the drilling process using the drill table and also hand drill for the riveting and also for the nuts and bolts.

4.2.4 Finishing process.

In the finishing process, several steps are taken which are grinding, brushing, and spraying.

Figure 4.2: brushing process

Figure 4.2: brushing process shows the brushing process using the hand grinder in the finishing process. This process is to remove the rust surface on the steel for the better surface.

Figure 4.2: painting process

Figure 4.2: painting process shows the painting process which is the final step in the finishing process. This process is to produce a beautiful coating surface to cover the steel surface plus as to prevent the project to rust.

4.3 FINISHED PRODUCT

The final product has been completed

Figure 4.3: finished product

Figure 4.3 shows the completion of the welding machine cart. The cart is complete in the week 13 which can be considered safe for the next step which is the testing of the functioning of the welding cart.

4.4 CHAPTER CONCLUSION.

The final product is complete and the need to know about the operation of the machine is needed. Knowing how machine operates can help in finishing the project faster.

CHAPTER 5

RESULT AND DISCUSSION

In this chapter, it will discuss about the project in process, problem occur and the functioning of the welding cart.

Every result in a project will have something to discuss about, thus this chapter will discuss the result of this project and view the problems encountered so that for the report to be produced, this project can be the guidance

5.1 THE FUNCTIONING OF THE WELDING CART

Figure 5.1**: THE FUNCTIONING OF THE WELDING CART**

Figure 5.1 show the welding cart with the welding machine, safety gear and tools, and also the gas cylinder. The welding cart is proven effective and can be used as the welding machine and the cylinder plus the safety gear and tools for welding is install on the cart for a week and still has not fall either the joint or the back wheel which is consider to receive the highest load than the front wheel which is ball bearing.

The top compartment is for the cooling system of the welding machine, the center compartment is for the safety gear and tool,

and the bottom compartment is for the power source of the welding machine. Plus at the back is for the gas cylinder, the cart has been made for the back compartment to support two cylinders.

5.2 THE PROBLEM ENCOUNTER

In the production of this project several problem encountered. Mostly problem encountered are during the fabrication process.

During the process, joint of the welding part is not stuck firmly together which is cause by the lack of skill in welding and might also be the problem with carbon rode used for the welding which can be consider as old and not suitable for the welding.

Besides that, the lack of tool also becomes the problem and causing the delay of the fabrication process. Tools provided are not enough and students need to buy their own tool which cost a lot of money.

There are also problem during the cutting process where the personal error occur due to lack of awareness causing a wrong cut is made which effect the amount of raw material that are originally used. The cause a wasting of raw material which can cause a lot of money waste on that part.

5.3 CHAPTER CONCLUSION

The chapter concludes on the functioning of the welding machine cart. There are problems occur in the process of producing this welding cart.

CHAPTER 6

CONCLUSION AND RECOMMENDATION

After finishing a report a conclusion is to be made so that what have been studied during the production of the project is taken note. Recommendations also need to be given by the students so that for the next project or someone that will used this report as a reference.

6.1 CONCLUSION

The objectives of this project is to developed and fabricate a welding equipment cart for mobility of the welding equipment and safety gear and also additional tool required during a welding process. This project is also a prerequisite for approval to get a diploma in mechanical engineering.

The title of this project is received from the supervisor and it compulsory for the students to complete this project to get 4 hours credit to graduate. This project also is done so that the students can apply on what they have learned during the three years of this course.

After 14 weeks of time given to finish the project, the project is finally complete and the objective, scope of the project is achieved. All the knowledge that has been learned for the three years of this course is successfully applied while completing this project.

6.2 RECOMMENDATION.

This recommendation is made so that for the next year students or juniors will have reference for doing their project.

The recommendation that can be made for this project is that basic skills in handling the machine should properly be remember and practically used so that the work produce is perfect and comes with the good quality.

Tools and equipment also should be properly provided so that the student that want make a project can do their project effectively. Students also need to take a good care of the tools provided so that the next person or other students can use the tool again.

Students also need to remember to be more careful during the working process so that an error in the cutting of the material could be avoided plus reducing the amount of raw material wasted.

For the production of the welding cart, a lighter material also should be used by not to forget the strength of the material. For the joining of the parts, bolts and not should be used as it is stronger and easy to work with.

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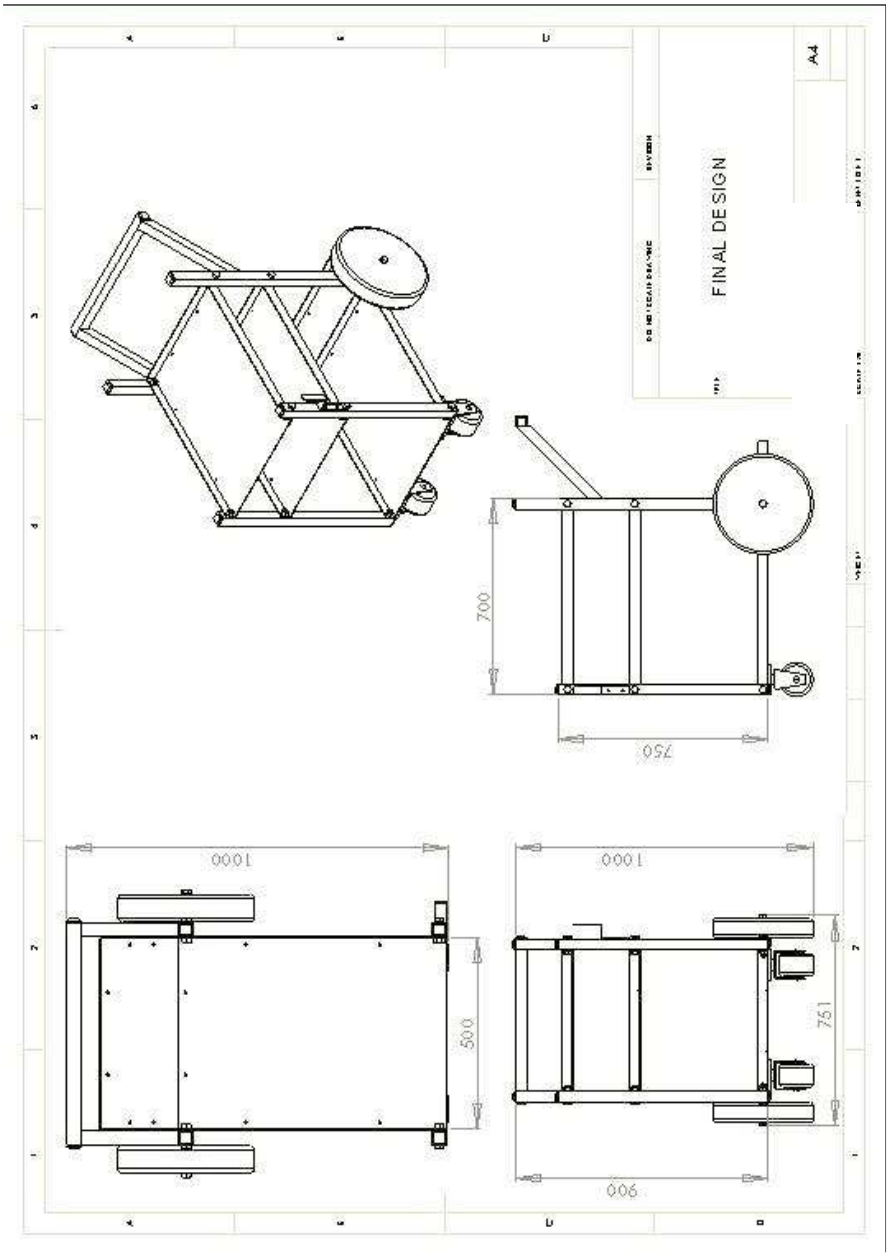
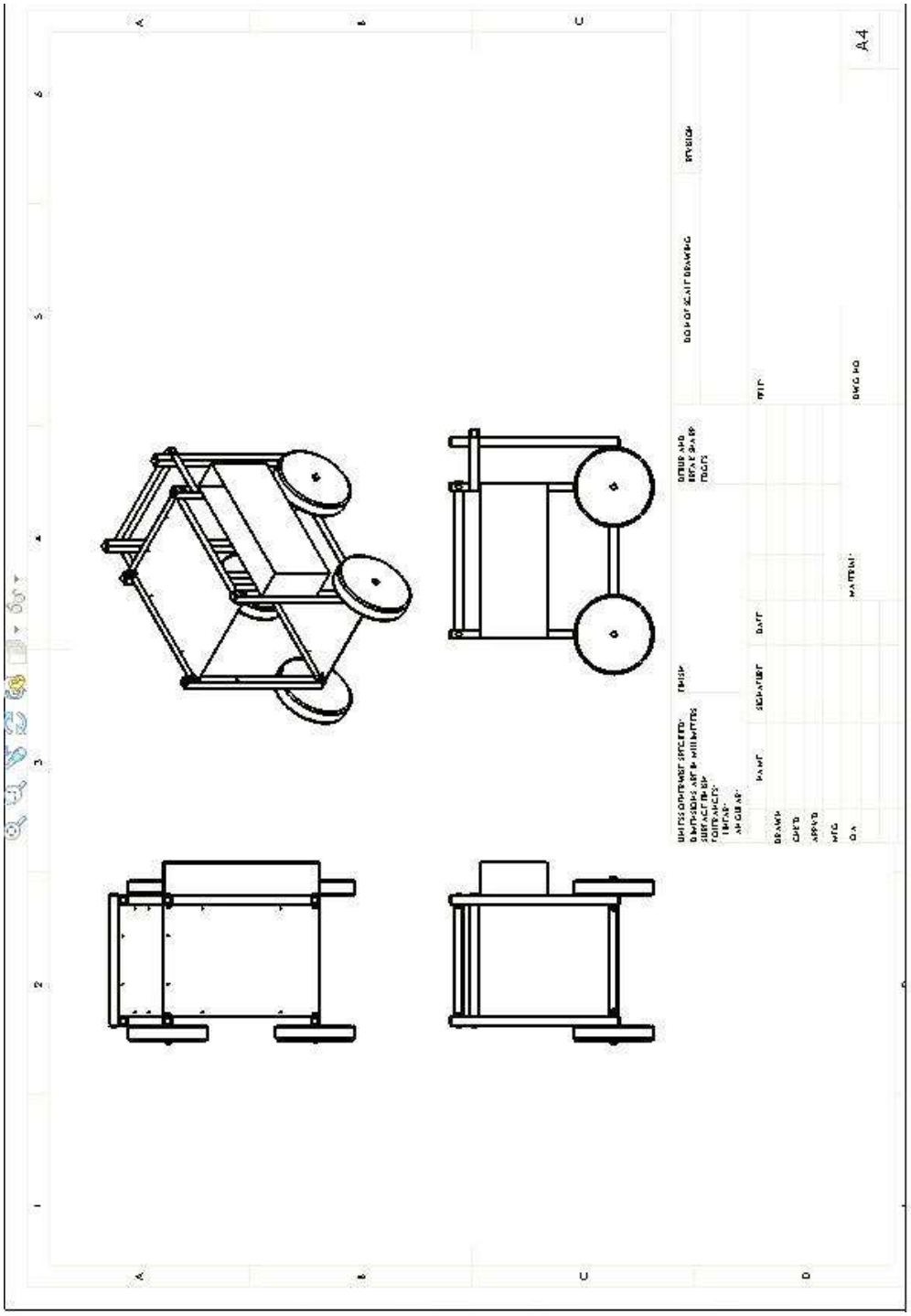
APPENDIX A1

DESIGN CONCEPT 1



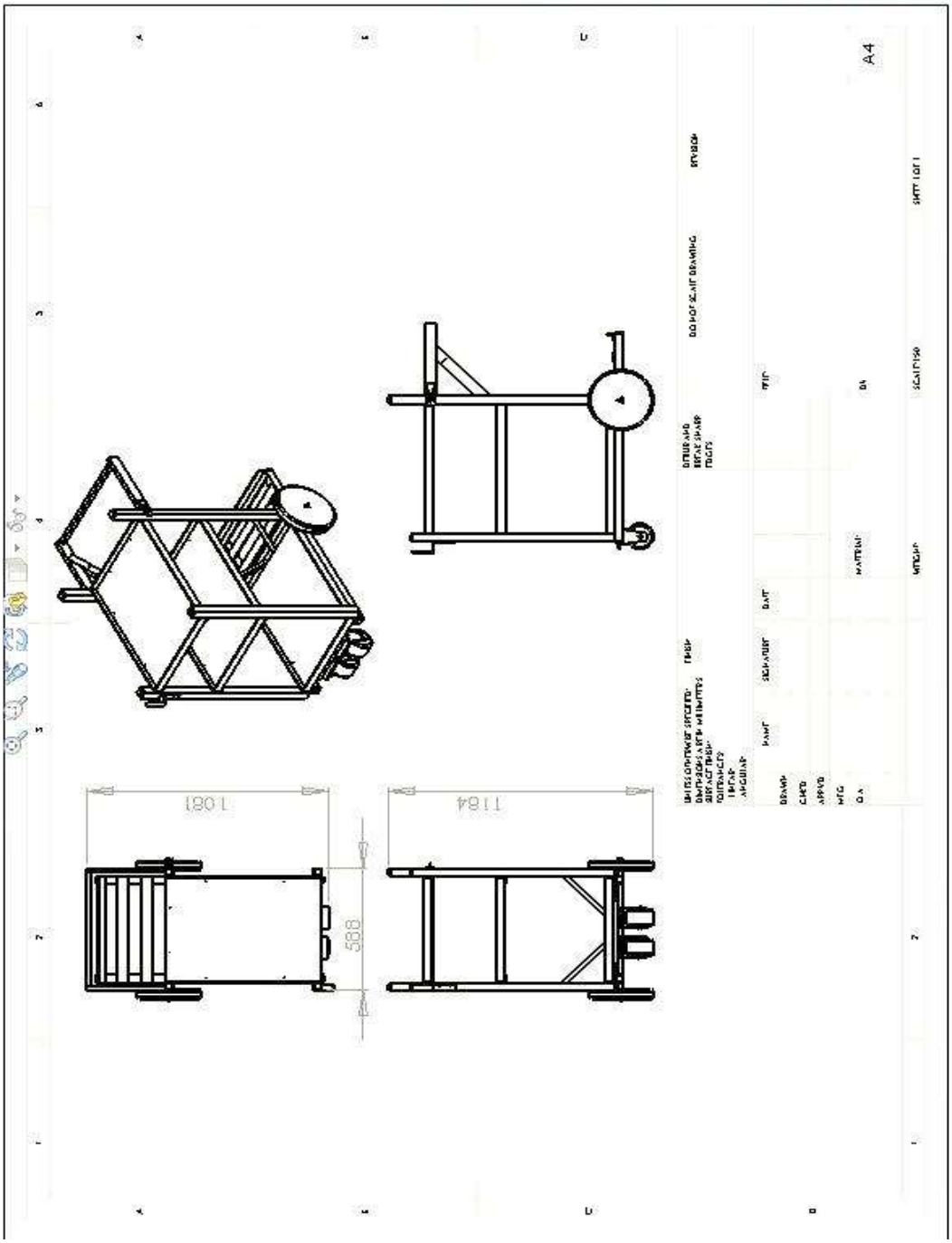
APPENDIX A2

DESIGN CONCEPT 2



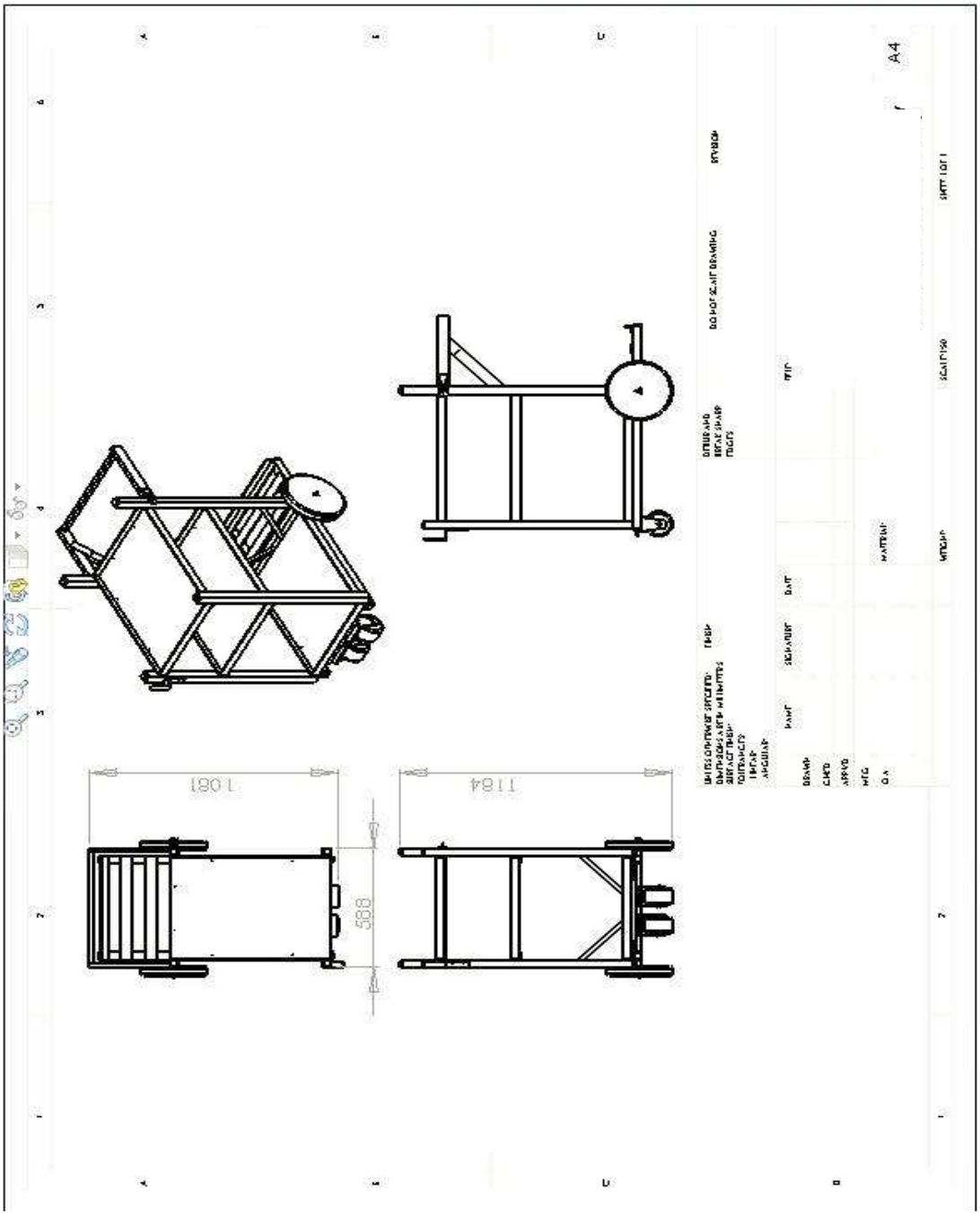
APPENDIX A3

DESIGN CONCEPT 3



APPENDIX B1

FINAL DESIGN



APPENDIX B2

FINISHED PRODUCT 2

APPENDIX B3

FINISHED PRODUCT 1

APPENDIX B4

FINISHED PRODUCT (WITH THE WELDING EQUIPMENT)

SUPERVISOR DECLARATION

I hereby declare that I had read this thesis and in my opinion, this thesis is sufficient in terms of scope and quality for the purpose of granting of Diploma of Mechanical Engineering.

Signature :

_____

Name of Supervisor : EN. ROSMAZI BIN ROSLI

Position : LECTURER

Date :

STUDENT DECLARATION

I declare that this thesis entitled “Welding Machine Cart” is the result of my own research except as cited in references. This thesis has not been accepted for any diploma and is not currently submitted in the candidature of any other diploma.

Signature :

_____

Name : ZULFADLI ADHA BIN NADZRI

ID number : MB10044

Date :

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ABSTRACT

Designing and fabricating a welding machine cart for the welders is a product that fulfills the welder's needs. This project uses many materials such as mild steel, galvanized iron, stainless steel and others. Overall, this project involves many processes, starting from the design concept, fabrication and assembling procedures. Even though there are many types of welding machine cart in the market, the completion of this new model provides a more practical usage.

ABSTRAK

Mereka bentuk dan menghasilkan troli mesin kimpalan untuk pengimpal merupakan salah satu produk untuk kepentingan pengimpal. Projek ini menggunakan pelbagai jenis bahan seperti keluli lembut, besi galvanic, keluli tahan karat dan sebagainya. Keseluruhan projek ini melibatkan berbagai proses bemrula dengan idea konsep reka bentuk, pemotongan bahan, mereka bentuk dan fabrikasi. Walaupun troli mesin kimpalan seperti ini telah banyak di pasaran, namun kelaininan dalam penghasilan troli ini telah dilakukan bagi memastikan ianya lebih praktikal untuk digunakan.

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LIST OF SYMBOLS

Mm	millimeter

LIST OF ABBREVATIONS

UWC1	Universal Welding Cart 1
TTWC	Three Tier Welding Cart
UWC2	Universal Welding Cart 2

UNIVERSITI MALAYSIA PAHANG

BORANG PENGESAHAN STATUS TESIS ◆

JUDUL: DESIGN AND FABRICATE THE WELDING MACHINE CART

SESI PENGAJIAN: 2012/2013

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