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POLITEKNIK SULTAN SALAHUDDIN ABDUL AZIZ SHAH

ADJUSTABLE WELDING TABLE

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Laporan ini dikemukakan kepada Jabatan Kejuruteraan Mekanikal sebagai memenuhi sebahagian syarat penganugerahan Diploma Kejuruteraan Mekanikal

JABATAN KEJURUTERAAN MEKANIKAL

JUN 2020

AKUAN KEASLIAN DAN HAK MILIK

TAJUK : ADJUSTABLE WELDING TABLE

SESI : JUN 2020

1. Kami, **1. MUHAMMAD AFNAN FIKRI BIN MOHD ZA'BA (08DKM18F1163)**
2. MOHAMAD FAIZUDDIN BIN MD RAFI (08DKM18F1133)
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Adalah pelajar tahun akhir **Diploma Kejuruteraan Mekanikal, Jabatan Kejuruteraan Mekanikal, Politeknik Sultan Salahuddin Abdul Aziz Shah**, yang beralamat di **Persiaran Usahawan, 40150, Shah Alam, Selangor**. (selepas ini dirujuk sebagai 'Politeknik tersebut').

2. Kami mengakui bahawa "Projek tersebut di atas' dan harta intelek yang ada di dalamnya adalah hasil karya/reka cipta asli kami tanpa mengambil atau meniru mana-mana harga intelek daripada pihak-pihak lain.

3. Kami bersetuju melepaskan pemilikan harta intelek 'projek tersebut' kepada 'Politeknik tersebut' bagi memenuhi keperluan untuk peanugerahan **Diploma Kejuruteraan Mekanikal** kepada kami.

Diperbuat dan dengan sebenar-benarnya diakui

Oleh yang tersebut;

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b) MOHAMAD FAIZUDDIN BIN MD RAFI	)	…….
(No. Kad Pengenalan: 000815-08-0823)	)	MOHAMAD FAIZUDDIN
c) MUHAMMAD NURHADI BIN MOHD NORI	)	…….
(No. Kad Pengenalan: 980329-01-6355)	)	MUHAMMAD NURHADI
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CONTENT

ACKNOWLEDGEMENT

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Besides, a big thanks to my groupmate for their cooperation in completing this Integrated project. They always sharing information and knowledge that they know with us. We also appreciate the helps from our seniors. Without their help, we couldn't finish this project on time.

Last but not least, lot of thanks to those who help us directly or indirectly so that we can complete our project before deadline. The most important is to thank my groupmates for willing to spend their time and sleepless night to complete this project. We have learnt a lot of knowledge throughout this project especially on the application of what we learnt in previous.

ABSTRACT

A welding table is a platform that is at waist level and it works like a workbench. This table use when working in metal fabrication with welding. A welding table is very useful because it gives the welder a stable place to work and also can provide assistance with both squaring and measuring. After some analysis, it was found that there were some problems experienced by the respondents when using the welding table. Among the problems experienced are such as back pain, table is too heavy, no safety features. Objective to build this project is to design the more efficiency welding table better than the current now. Besides, it will more comfortable while using. For methodology research, we use pneumatic system for adjust the height of the table. Next, we use lighter iron than usual so it is easier to move. A survey has been done to identify the problems about the existed welding table and things that need to be upgrade. We analysis the survey and determine the important parts that need to be upgrade on the welding table. What we get from this project is it make worker easier to do welding things. But the disadvantage of our project is that it cannot weld large items due to the small size of the table we created. We plan to create larger adjustable welding in the future.

User's comfortable our priority

CHAPTER 1

INTRODUCTION

1.1 RESEARH BACKGROUND

You may have heard of a welding table previously, and how beneficial it is to have one. A welding table is a platform that is at waist level and it works like a workbench. When you are working in metal fabrication with welding, you utilize it. A welding table is extremely helpful because it provides the welder a steady location to work and likewise can offer support with both determining and squaring. No matter what size they are, all welding tables are made from steel that can endure the rigors and intense heat that comes with welding.

When you use a welding table, you can perform many different tasks. Many jobs require a welder to be able to square corners, do gauging, and measuring. A welding table is an ideal platform for doing all of that without needing to endure extra tension or included troubles. You can likewise use a welding table for mounting purposes, such as flexing brakes and jigs.

In our project adjustable welding table, we want to innovate to make this welding table more usable. Firstly, we want to make this adjustable welding table comfortable for user. So we make the welding table that can adjust the height according to the user's suitability. Furthermore, we want to make this adjustable welding table easy to carry. So we put the wheel at each foot of the table. Finally, we put the emergency button if something bad happens while doing work.

1.2 PROBLEM STATEMENT

1. The user is uncomfortable and hurts back pain because the height of the table is not adjustable.
2. Difficult to carry anywhere.
3. The current welding table is very heavy.
4. Has no safety features in case of emergency.

1.3 OBJECTIVE

Objective to build the adjustable welding table is to design the more efficiency welding table compared to the current practices. The adjustable welding table can be used by many people especially workers and students. This project is to make the user more comfortable and less hurt back pain. This adjustable also lighter than the current welding table and easy to carry anywhere. We also combine the mechanical and electrical part in this project.

1.4 RESEARCH QUESTION

1. Is it possible to adjust the height of welding table?

2. What type of material that can used to make welding table lighter?

1.5 SCOPE OF RESEARCH

The scopes and limits to this research are:

1. Maximum load on the table is limit to 80kg.

2. This product could not be exposed to water.

3. The battery of this table need to charge.

4. Could last for a long time with a good care.

1.6 CHAPTER'S SUMMARY

In this chapter, the studies was explained about its origin of ideas and inspirations. All the objectives were made out of all the problem statements. The objective for this project along with the importance will that will be comfortable and light causing it to be more convenient for and even the scope of this project only. Thus, this new welding table could be used for daily routine with a really good care for a longer lifetime.

CHAPTER 2

LITERATURE REVIEW

2.1 INTRODUCTION

This chapter discusses previous research. Literature review is a literature search and evaluation that is available in the selected subject area or topic. It is a state of the art document about a topic or topic that is written. We also do questionnaires to people in some workshops that use welding table to get their feedback. we also did a study on welding table that was invented 10 years ago.

2.2 THE DEVELOPMENT OF WELDING TABLE

2011

Figure 1

This welding table does have a more stable leg structure and is significantly higher in quality, being able to bear a much heavier load. However, for a portable table, it's heavy and doesn't have a tilt function. They are designed well, in an X shape rather than parallel lines. This layout

allows a useful range of clamping positions. It also lasts much longer than the other table due to higher quality components. It eliminates the need for locking and clamping devices, which are generally the first to break.

2012

Figure 2

It suits the most diverse range of welding applications, has the largest surface area, and comes with high quality and heavy-duty materials. A downside is that it's one of the heaviest tables available at 318 pounds. Once it's set up, it can either remain stable on its six legs and become a hub for your welding and cutting needs, or be moved around on its four caster wheels. These make it easy to move around your workshop or garage. It comes at a higher cost than most of the other tables available, but it includes the most diverse range of features and suits both hobbyists and industrial workshops alike.

2013

Figure 3

This welding table give you a convenient place to weld small components. It's taller than most tables available, which is useful when you want to see your welding close-up while protecting your back. There are no fixture points on it unless you make your own. However, the included torch loop is handy for resting your torch in. It doesn't have enough room for larger projects, and although it's ideal for bringing work up to you, there are no adjustments if you want to work lower down.

2014

Figure 4

This table with a start-up clamping kit, is one of the best types of tables on the market. It comes with a series of 0.63″ (16mm) holes, with a vast range of fixtures that sit into the holes without the need for nuts and bolts. It makes clamping frames very quick and easy and gives a wide

range of options. These tables require frequent cleaning and aren't suitable for small components due to the holes. However, this table comes in a useful size. It's adjustable in height and makes repetitive shapes easy to duplicate with the stops and clamps it provides.

2017

Figure 5

This table is an impressive wheelable table that includes everything a clamping table needs. This is the most heavy-duty table available, and quantity-wise, it offers more than what 99% of other tables on the market do. It's a specialized table for projects requiring clamping and detailed set-ups. It can be used for any big project, but it's designed for securing with precision to create the exact set-ups you desire consistently among multiple projects. It's a heavy table, but it's surprisingly easy to roll around with its heavy-duty caster wheels and secure structure. It can also bear an impressive 1500 pounds of weight.

2.3 METHOD OF MAKING ADJUSTABLE WELDING TABLE

- PNEUMATIC SYSTEM

  Pneumatic systems used in industry are commonly powered by compressed air or compressed inert gases. A centrally located and electrically powered compressor powers cylinders, air motors, pneumatic actuators, and other pneumatic devices. We use pneumatic system to lift the plate of the table so user can lift the plate according to their suitability.

THE ADVANTAGES OF USING PNEUMATIC SYSTEM

- Simplicity of design and control—Machines are easily designed using standard cylinders and other components, and operate via simple on-off control.
- Reliability—Pneumatic systems generally have long operating lives and require little maintenance. Because gas is compressible, equipment is less subject to shock damage. Gas absorbs excessive force, whereas fluid in hydraulics directly transfers force.
- Safety—There is a very low chance of fire compared to hydraulic oil. New machines are usually overload safe to a certain limit.

DISADVANTAGES OF USING PNEUMATIC SYSTEM

- Less energy efficiency.
- Not ideal for combustible bulk solids.

2.4 MAINTENANCE

Maintenance for this adjustable welding table are relevant to keep use it. User just only check the power supply if it still has the power to generate to actuator. If the power supply got no power user just has to charge it or change it with the new one.

2.5 ESTIMATE WEIGHT

The estimated load of this welding table is very important in designing a welding table that can accommodate the weight or burden. The adjustable welding table can lift the load up to 100kg.

2.6 CHAPTER'S SUMMARY

As to conclude this chapter, literature review is important to showcase all the studies of materials and methods to enhance the knowledge on this project. Every and others projects that are related to this is really helpful especially for us to understand it fully. After a lot of materials and methods were discussed and researches were done, the materials that are the most compatible for our project.

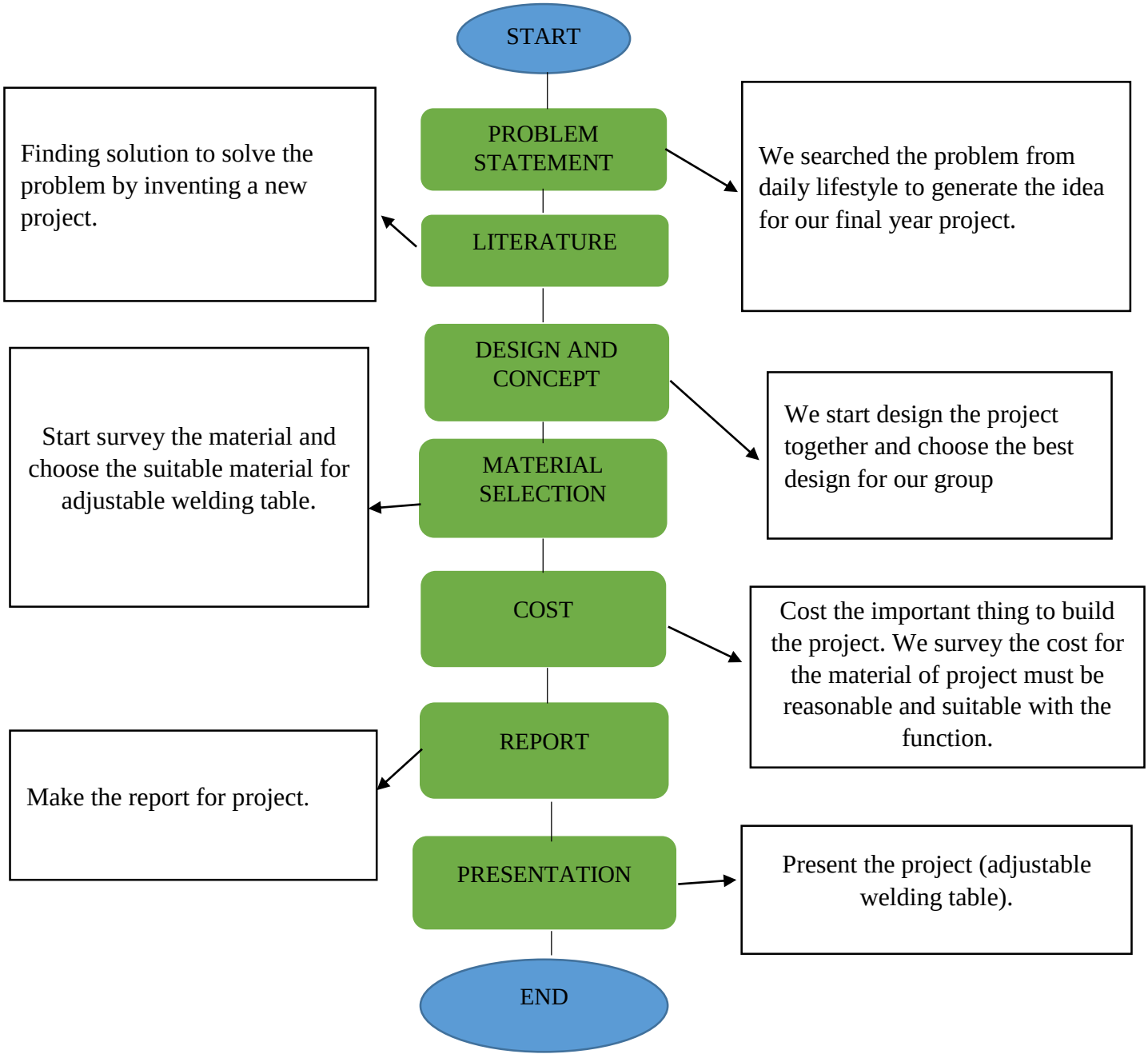
CHAPTER 3

METHODOLOGY

3.1 INTRODUCTION

In this chapter, there will be a lot of information about the process and journey through out the making of our final project. There will be flow chart showing the process of us making the whole project. This flow chart will explain the processes we took. Next, is the Gantt Chart, which will show the actual and planning throughout all the 15 weeks of our final year project journey. However, in this chapter, we also will show the method we researched to carry our final year project. Although, the methods have its own advantages and disadvantages and it will be explained.

3.2 FLOW CHART

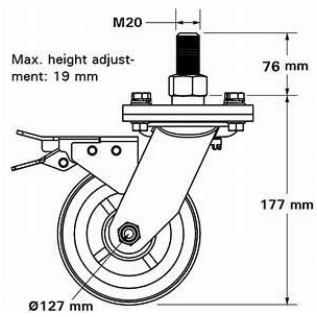


3.3 MATERIAL SELECTION

1. ACTUATOR

We used this actuator to adjust the height of the welding table. Actuator is like hydraulic jack but it uses pneumatic system. Pneumatic is a system that uses energy stored in compressed air to produce a work. In its application, pneumatic systems are widely used as automation systems. A pneumatic system is basically a system that uses mechanical systems of air as a compressor. This actuator can lift load until 100kg-120kg.

2. WHEEL



The wheel is used to make it easy for the user to move the table. The wheel can also be locked to prevent the table from moving during welding work. Welders with smaller shops or who ply their trade at multiple worksites may find a portable welding table more useful than a fixed one. It makes them easy to transport around. Many come with wheels.

3. EMERGENCY BUTTON

An emergency call button, also known as a medical alarm or a panic button, is part of the medical alert system and provides an easy and effective way to get assistance if and when needed in an emergency situation.

4. STAINLESS STEEL

We use stainless steel for a body of our project, adjustable welding table. Stainless steel offers many advantages to the architectural/ornamental metal user. The major advantages include its high corrosion resistance allowing it to be used in rigorous environments. It is resistance to fire and heat allowing it to resist scaling and retain strength at high temperatures.

5. MILD STEEL PLATE

We use mild steel plate as a place to put materials that we want to weld. One of the most beneficial properties of mild steel is it can be bent, cut and twisted to create the desired shape easier than other metal. It is one of the reasons why carbon steel (mild steel) is popular in many industries from the manufacture of household items to structural applications to the DIY and home improvement project. The high level of demand makes mild steel a widely produced material and therefore a very affordable material.

6. BATTERY

We used battery as a power supply to connect to actuator. So the welding table can be lifted without connect it to plug. This battery can give power up to 12v so it suitable for actuator.

3.4 METHOD SELECTION

This method selection process is important so that the method choose is accurate and suitable for the product. This method selection will avoid money-lost and time taking processes. Hence, it is important to carry out this method selection process. There is methods that could be carried out:

- PNEUMATIC SYSTEM

  Pneumatic systems used in industry are commonly powered by compressed air or compressed inert gases. A centrally located and electrically powered compressor powers cylinders, air motors, pneumatic actuators, and other pneumatic devices. We use pneumatic system to lift the plate of the table so user can lift the plate according to their suitability. Pneumatic systems generally have long operating lives and require little maintenance. Other than that, there is a very low chance of fire compared to hydraulic oil.

3.5 FABRICATION

1. First of all, we cut stainless steel into 4 rods measuring 0.7 meters each to be used as table legs.
2. After that, we cut another stainless steel into 8 rods measuring 0.4 m.
3. then, we weld all the stainless steel to form the frame of our welding table.
4. Next, we weld the wheels under each leg of our table.
5. for the actuator, we connect it to the dpdt switch.
6. Then, we connect dpdt switch to power supply which is we use motorcycle battery
7. After that, we weld the plate at the bottom of our table to be used as a place to place the actuator.
8. Lastly, we weld the mild steel plate on top of the actuator

3.6 TEST RUN

Test run is carried out to determine the strength and end result of the product. In this test run, welding table is tested to determine the speed that actuator can lift the plate of the table. First, we measure the time for the actuator to lift the plate of the table at the height of 10cm, 20cm and 30cm. Then, we measure it 3 times for each height so we get the average time. After that, we put 15kg load on the plate of the table so we could know if there was a time difference or not.

Height	1st attempt	2nd attempt	3rd attempt	Average time
10 cm	18.40s	17.55s	17.10s	17.63s
20 cm	31.21s	29.62s	29.13s	29.99s
30 cm	45.82s	46.45s	45.10s	45.79s

Height with 15 kg load	Time
10 cm	19.53s
20 cm	34.45s
30 cm	51.70s

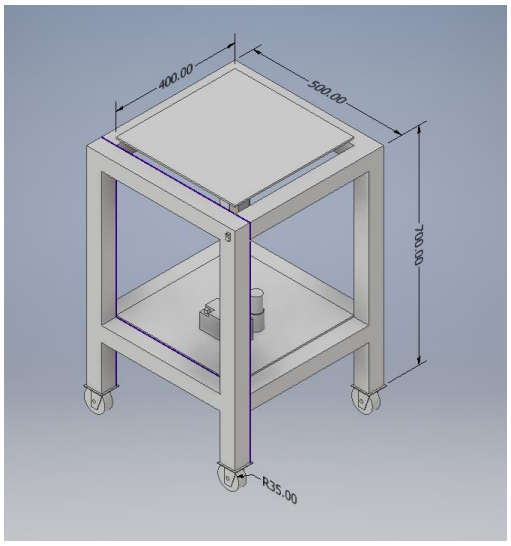
3.7 ANALYSIS DATA

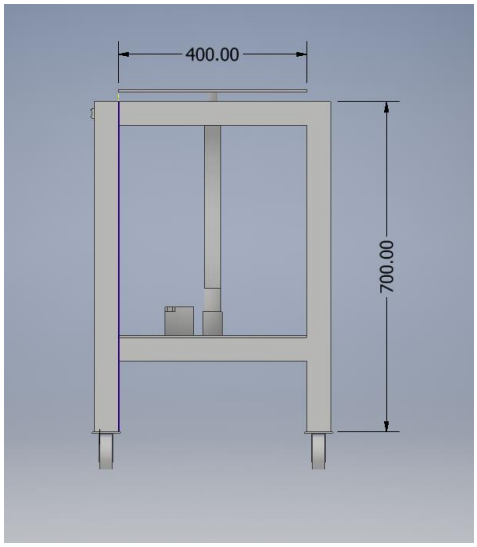
The process of evaluating data using analytical and logical reasoning to examine each component of data provided. This form of analysis is just one of the many steps that must be completed when conducting a research experiment. Data from the test run is gathered, reviewed and the analysed to form findings, discussions and conclusion. In this project the data collection is collected from the speed of the actuator and the load that actuator can lift. We can conclude that our project test run fulfil our scope of project. Even the speed of actuator quiet slow but we satisfied with the result.

3.8 REPORT WRITING

Report writing is one of the most crucial step in every project invented. It is important to make a report based on the project, test run and analysis so that future improvements nor expansion of knowledge could be done. Our report writing is based on the analysis and findings that we collected throughout this whole process of completing this project.

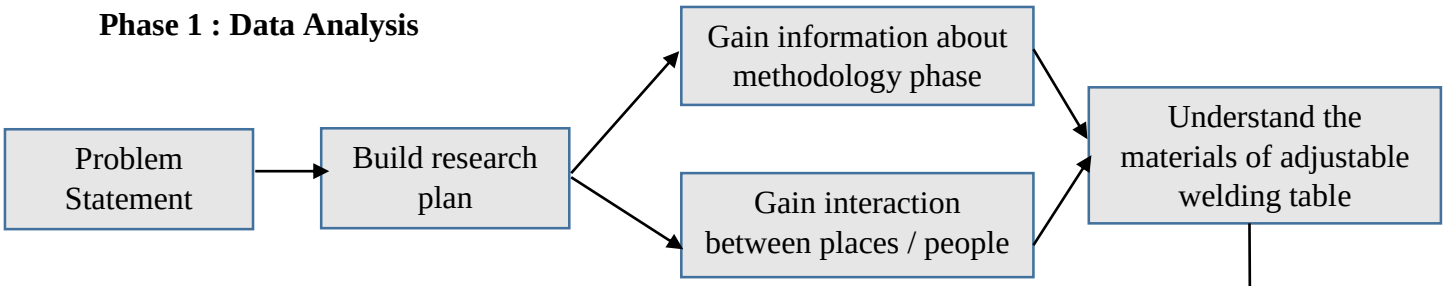
3.9 DESIGN OF PRODUCT



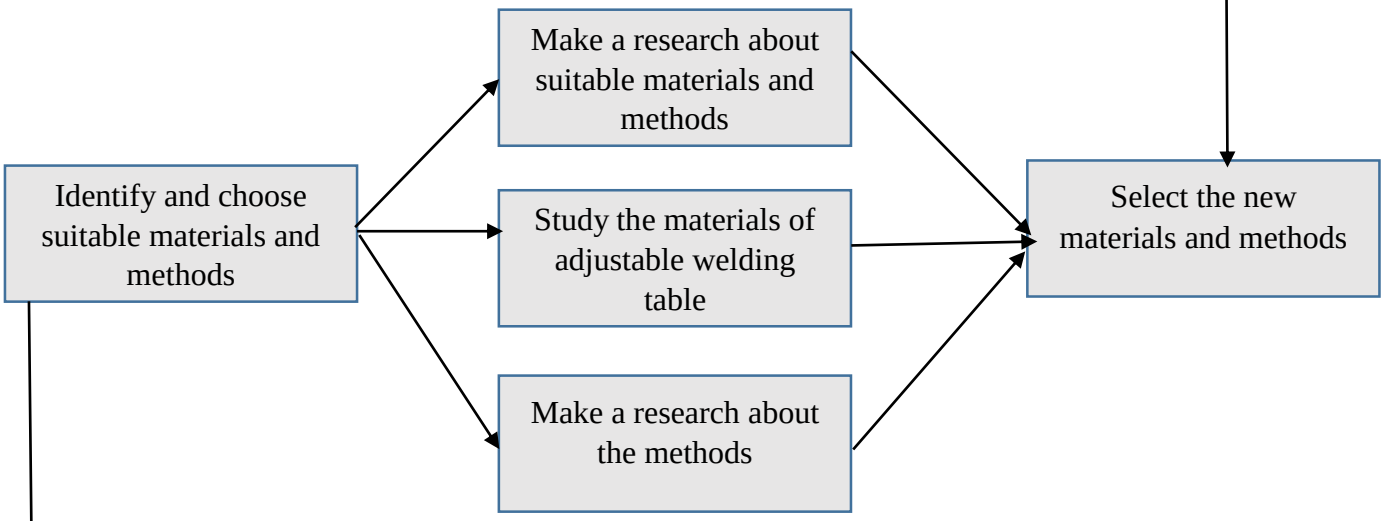


3.10 METHODOLOGY PHASE

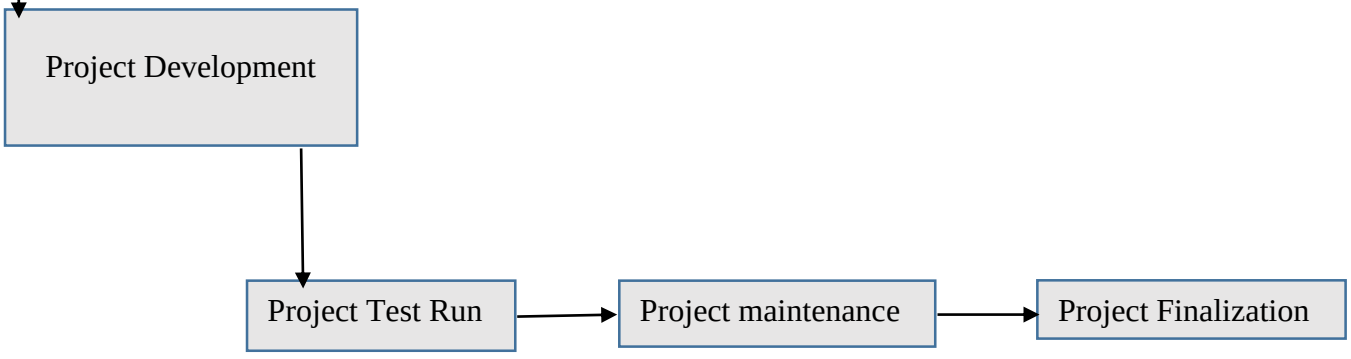
Phase 1 : Data Analysis



Phase 2 : Method and Material



Phase 3 : Preliminary Study



3.11 BUDGET CALCULATION

NO	MATERIAL	QUANTITY	PRICE (RM)
1.	Actuator adjustable	1	170.00
2.	Wheel	4	70.00
3.	Mild steel plate	1	100.00
4.	Stainless steel	12	70.00
5.	Emergency button	1	30.00
6.	Battery	1	30.00
7.		Total	470.00

3.12 GANTT CHART

project Activity	weeks 1	2	3	4	5	6	7	8	9	10	11	12	13	14
Briefing and Project Planning														
Project Design														
Material Selection														
Materials Purchase														
Method Selection														
Fabrication														
Test Run														
Analysis Data														
Report Writing														
Video and Slide making														
PITEX preparations														
PITEX presentation														

Planning

Actual

3.13 SUMMARY

As a conclusion, the methods implemented in this project are very crucial and important to complete the project. The materials used in the project will create a. However, this method will affect the result totally if one of the method is change.

CHAPTER 4

FINDINGS AND ANALYSIS

4.1 INTRODUCTION

This chapter we put the analysis of survey that we made so we can identify the problems about current welding table. From the survey we can produce a good product that can help user. However, in this chapter we also explain the advantages and disadvantages for our product.

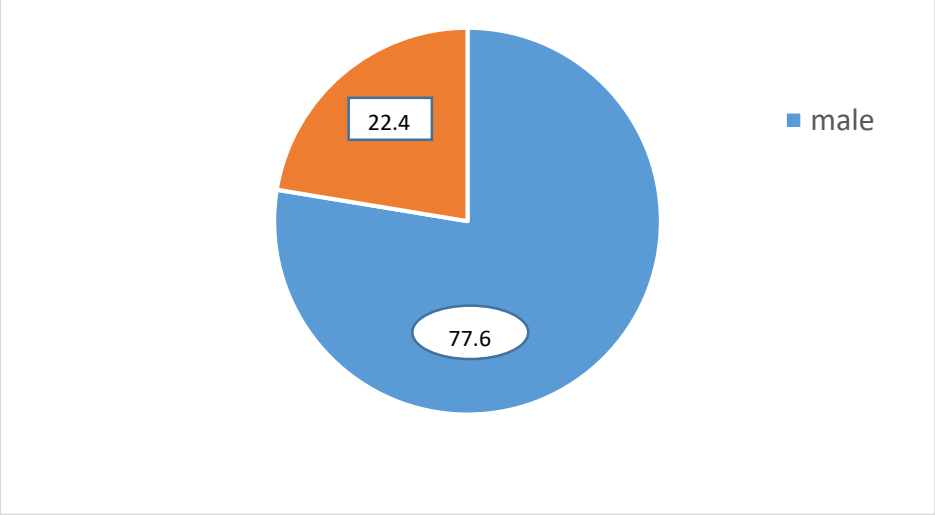
4.2 ANALYSIS OF SURVEY

A survey has been done to identify the problems about the existed welding table and the things that need to be upgrade on the welding table so that it is easier for user to use it. From the survey, we can determine the important parts that need to be upgrade on the welding table with people demand. This can help us to produce a good product that can help other make welding easier.

https://docs.google.com/forms/d/e/1FAIpQLSfBKRpmHjrI4YCRMDP_gSBuAcGpD4nlRVHWGYQTM7cRqsB91Q/viewform?usp=pp_url

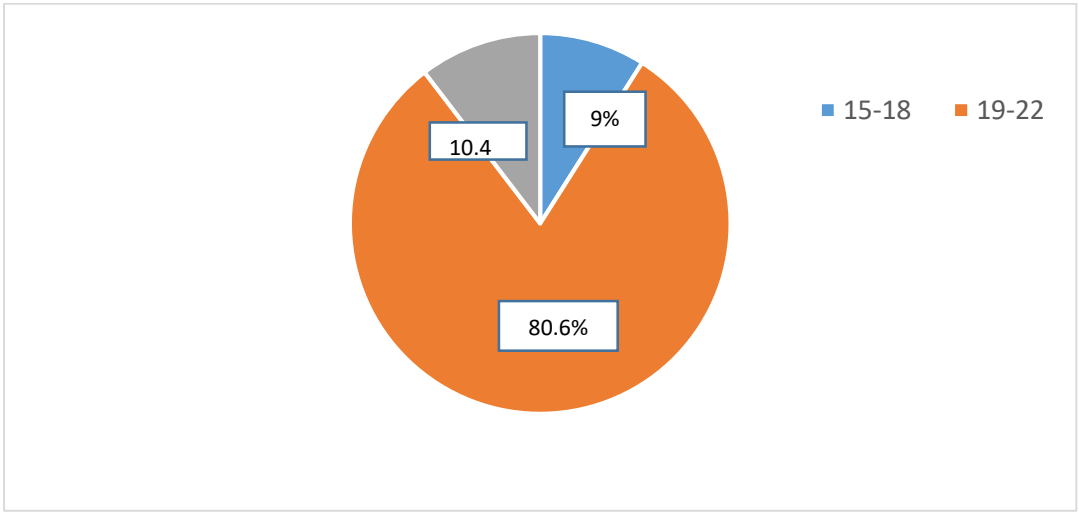
Gender

67 responses



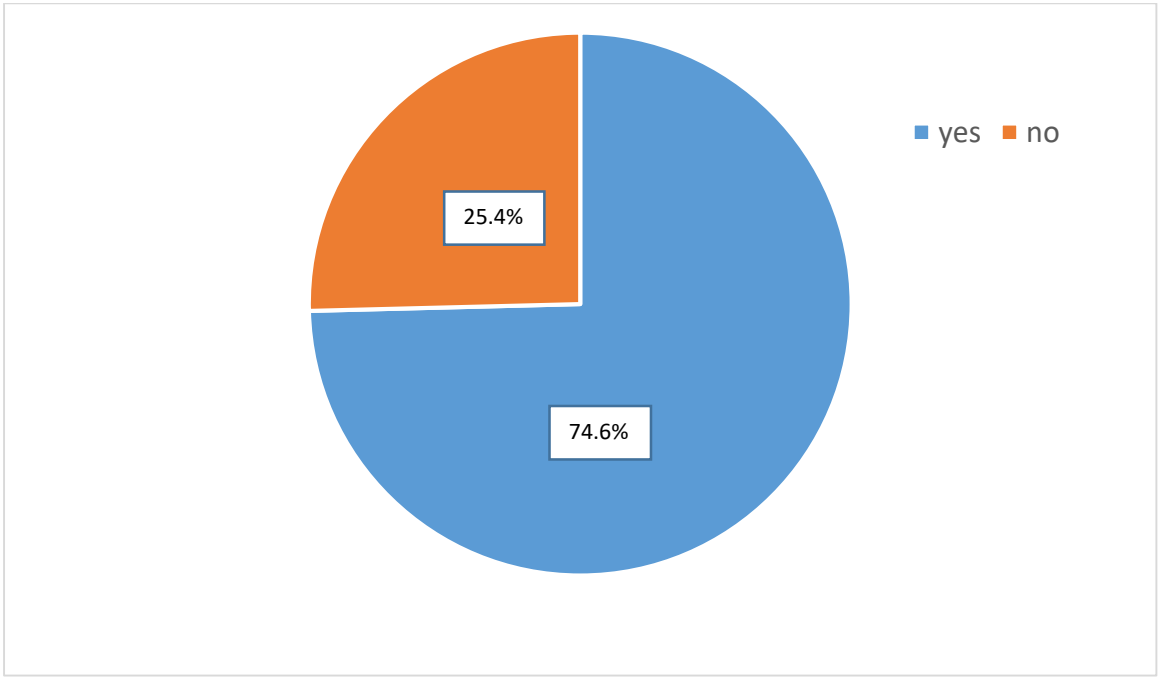
Age

67 responses



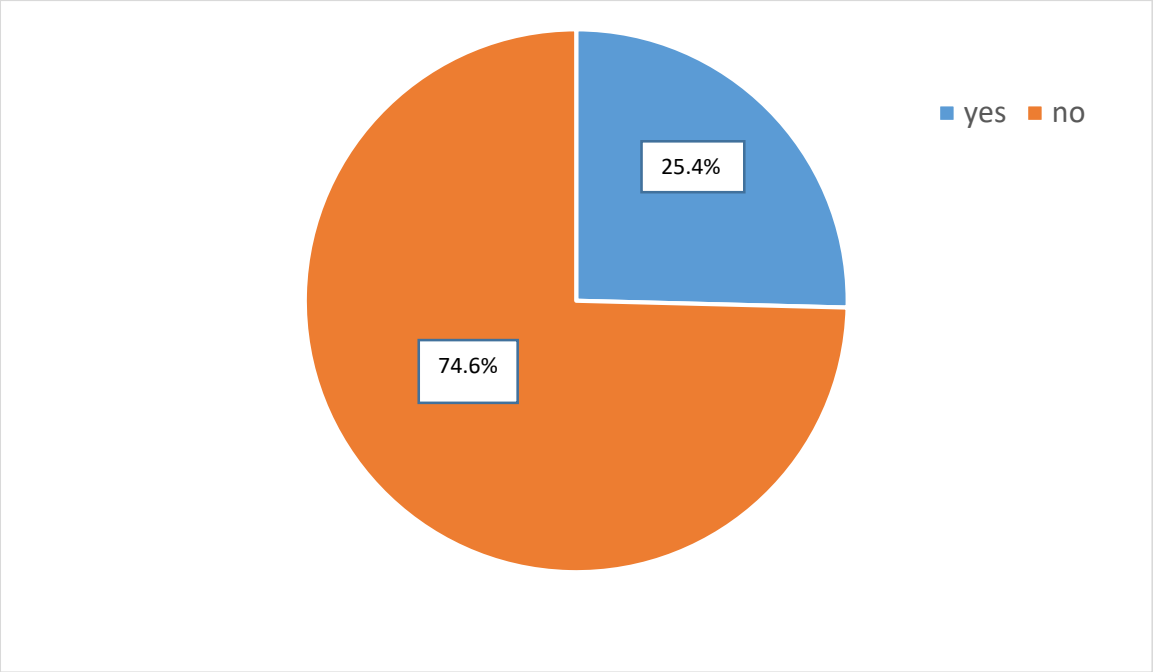
1. Have you ever had back pain while welding?

67 responses



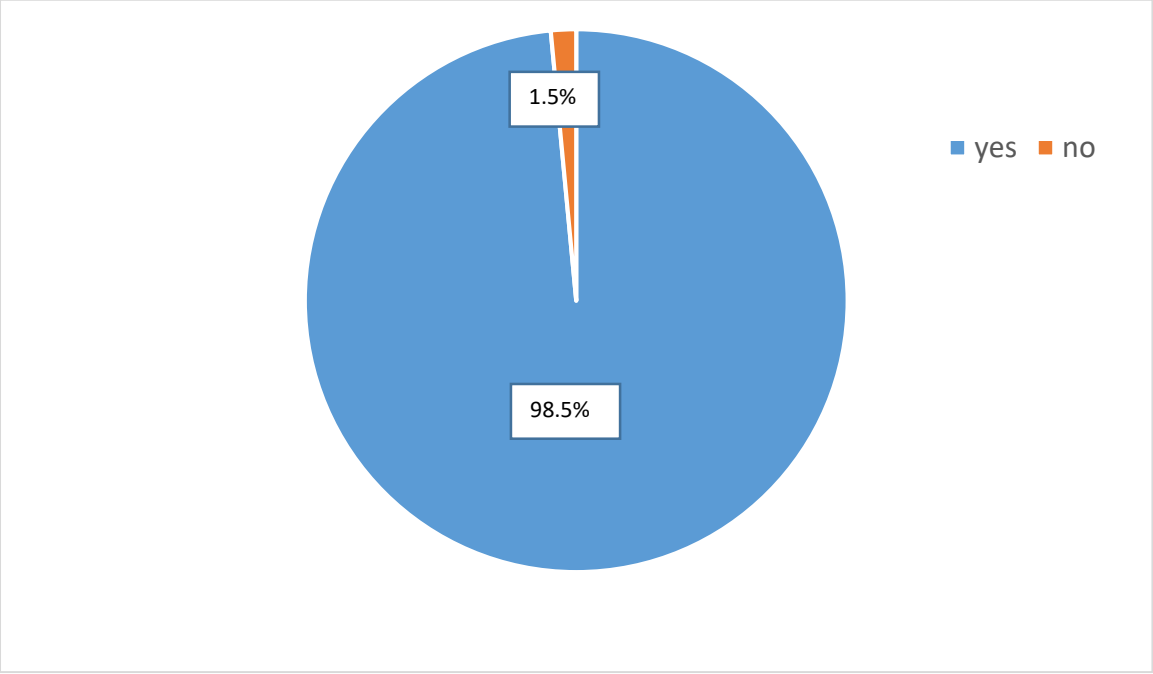
2. Do you feel comfortable when welding with a table that cannot be adjusted the height?

67 responses



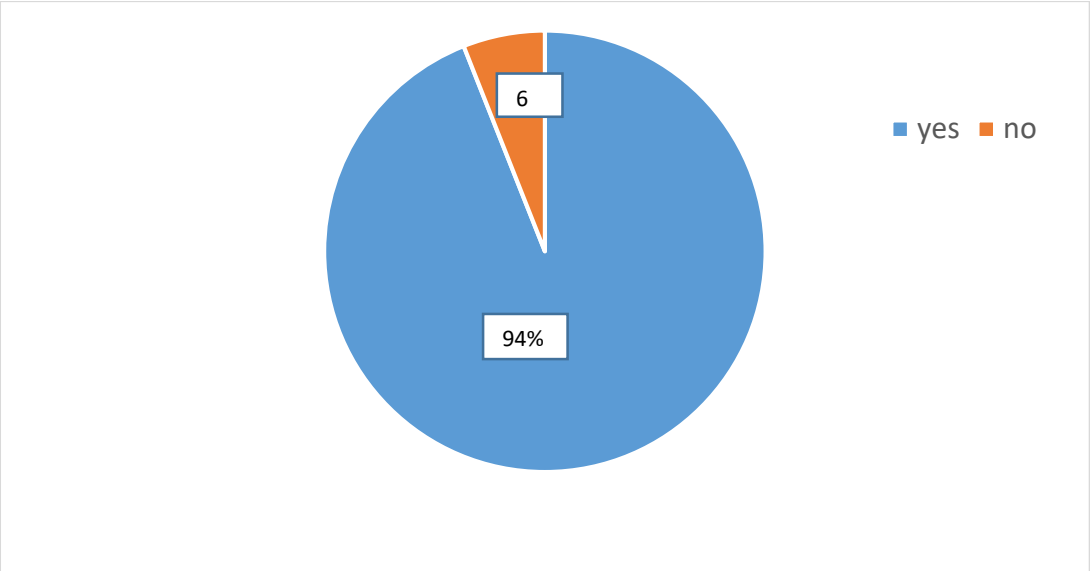
3. Do your job easier if the angle plate of welding table is adjustable

67 responses



4. Doing the wheel under the welding table makes it easy for you to move the table anywhere easily?

67 responses



4.3 PRODUCT TESTING

Test run is carried out to determine the strength and end result of the product. In this test run, welding table is tested to determine the speed that actuator can lift the plate of the table. First, we measure the time for the actuator to lift the plate of the table at the height of 10cm, 20cm and 30cm. Then, we measure it 3 times for each height so we get the average time. After that, we put 15kg load on the plate of the table so we could know if there was a time difference or not.

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Height with 15 kg load	Time
10 cm	19.53s
20 cm	34.45s
30 cm	51.70s

4.4 ADVANTAGES AND DISADVANTAGES

Advantages

- Height of this adjustable welding table can adjust from 0.9m to 1.2m
- Light and easy to carry.
- Maintenance for this table is cheap

Disadvantages

- the size of this table is small
- less stable

4.5 CHAPTER'S SUMMARY

As a conclusion for this chapter, the analysis and findings have been made. This adjustable welding table has a lot of advantages however there are every cons to pros. Hence, the challenges are taken as a room for improvements and more developments for future generation and well as to enhance their knowledge on the project we carried out. Test run is carried out to determine the fullest potential of actuator. The relationship is really well shown in the grafts.

CHAPTER 5

DISCUSSION , CONCLUSION AND UPGRADE PLAN

5.1 INTRODUCTION

This chapter explains about discussion , conclusion and upgrade plan all together for the project. From the data from the test run of the project, the analysis have been done. Hence, the discussion from all the results of test run and analysis will be explain in this chapter. Then , the conclusion will be made based on the discussion and upgrade plan that have been made.

5.2 DISCUSSION

There are few steps need to be done to completing this project. One of them is we make a survey questionnaire for PSA student those who ever have used the welding table so we got the problem statement from this. Then designing process. This process may use Autocad or Inventor to make it done. Our group had chosen to use inventor to make it easier to design. Inventor can create 3D and actual design.

In term of material selection, we had chosen suitable material for our project. We choose light and solid material to produce the project. It is because, we want to ease all the user. User can weld without any problem and easy to carry that table to anywhere.

Then, for the test run for this project we measure the time for the actuator to lift the plate of the table at the height of 10cm, 20cm and 30cm. Then, we measure it 3 times for each height so we get the average time. After that, we put 15kg load on the plate of the table so we could know if there was a time difference or not. We can conclude that our project test run fulfil our scope of project. Even the speed of actuator quiet slow but we satisfied with the result.

Last but not least, for future improvements, a lot of upgrades could be make to improve the products quality and also to make the time taken of making the product decreases.

5.3 BENEFITS FOR THE SOCIETY

- Adjustable welding table helps user to welding without hurts back pain and uncomfortable because the height of that table is adjustable.
- User can carry that adjustable welding table easily because that table is light and has wheel under the table.
- The emergency button is very helpful if bad things happen to user.

5.4 CONCLUSION

As a conclusion, the methods implemented in this project are very crucial and important to complete the project. Thus, as stated in the proposal, this project is agreed and accepted by Pn Nazratulhuda binti Awang@Hashim, our supervisor for the project. The materials used in the project will create a light and can be adjusted suitable with user. Plus, this project is very convenient and helpful for the user to weld.

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