



POLITEKNIK SULTAN SALAHUDDIN ABDUL AZIZ SHAH

MODERN PLYWOOD HOLDER (MPH)

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JABATAN KEJURUTERAAN AWAM

JUNE 2019

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

JABATAN KEJURUTERAAN AWAM

JUNE 2019

AKUAN KEASLIAN DAN HAK MILIK

TAJUK : MODERN PLYWOOD HOLDER (MPH)

SESI : JUN 2019

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adalah pelajar tahun akhir Diploma Kejuruteraan Perkhidmatan Bangunan, Jabatan Kejuruteraan Awam, Politeknik Sultan Salahuddin Abdul Aziz Shah, yang beralamat di Persiaran Usahawan, Seksyen U1, 40150, Shah Alam, Selangor.

2. Kami mengakui bahawa MODERN PLYWOOD HOLDER (MPH) dan harta intelek yang ada didalamnya adalah hasil karya/ reka cipta asli kami tanpa mengambil atau meniru mana-mana harta intelek daripada pihak lain.

3. Kami bersetuju melepaskan pemilikan harta intelek MODERN PLYWOOD HOLDER (MPH) kepada Politeknik Sultan Salahuddin Abdul Aziz Shah bagi memenuhi keperluan untuk penganugerahan Diploma Perkhidmatan Bangunan kepada kami.

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sebagai penyelia projek pada tarikh:.....

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LIST OF SHORT FORM

OSB	Oriented Strand Board
MPH	Modern Plywood Holder
PERKESO	Social Security Organization
HSS	Hollow steel structure
OMSD	Occupational Muscular Skeletal Disorders

APPRECIATION

Grateful for the Divine wish and congratulations on our great visit to the Prophet Muhammad, we were able to successfully complete the final project within a set period of 6 months without facing any difficult issues as a condition of conferring a Civil Engineering Diploma in the June 2019 session. We thank everyone involved directly and indirectly, especially our supervisor Mrs. Sarah Afzan Binti Abd Karim who has provided us with all the guidance, advice, encouragement and constructive criticism we have been able to complete in our final project report. Not to mention friends and family members who have been very helpful in terms of finances and finances in completing this final project assignment. We are grateful to Allah SWT for this final project. We hope this report can serve as an example and a guide to the parties involved in the future.

ABSTRAK

Papan lapis adalah produk bahan bangunan yang biasa digunakan di dunia. Papan lapis sering digunakan dalam pembuatan perabot dan pembinaan rumah. Ia mempunyai pelbagai jenis, berat dan saiz. Akibatnya, terdapat kesukaran yang dihadapi oleh pekerja dalam memindahkan papan lapis dari satu tempat ke tempat lain. Kaedah mengangkat papan lapis yang biasa digunakan oleh pekerja adalah kaedah konvensional. Terdapat masalah apabila seorang pekerja mengangkat papan lapis menggunakan kaedah konvensional yang menyebabkan kecederaan pada pekerja. Tambahan pula, sehingga hari ini terdapat pelbagai jenis alat pengangkat papan lapis yang terdapat di pasaran di antara mereka, *Gorilla Gripper* dan *Pane Carry Handle*. Semua jenis alat angkat ini terdapat di pasaran. Walau bagaimanapun, agak sukar untuk mencari alat angkat papan lapis yang mempunyai roda sebagai alat untuk memindahkan papan lapis tanpa menggunakan tenaga kerja yang banyak. Misi kumpulan adalah untuk menyediakan produk yang memenuhi keperluan pengguna hari ini yang mahukan kemudahan dan pada masa yang sama, menjimatkan masa dan tenaga boleh diperolehi. *Modern Plywood Holder* (MPH) telah dibangunkan untuk memudahkan proses mengangkat papan lapis untuk pekerja.

ABSTRACT

Plywood is a commonly used building material product in the world. Plywood is often used in furniture making and home construction. It has different types, weights and sizes. As a result, there are difficulties faced by workers in moving plywood from one place to another. The method of lifting plywood that is commonly used by workers is conventional method. There is a problem when an employee lifts a plywood using conventional methods that cause injury to the worker. Furthermore, until today there are various types of plywood lifting tools available in the market among them, Gorilla Gripper and Pane Carry Handle. All these types of lifting tools are available in the market. Nevertheless, it is quite difficult to find a plywood lift tool which has wheels as a tool to move the plywood without using too much labor. The group's mission is to provide products that meet the need of today's consumers who want the convenience and in the same time, saving time and energy can be obtained. Modern Plywood Holder (MPH) was developed to facilitate the process of lifting plywood for workers.

Keywords — Plywood, Conventional Method

PRODUCT DESCRIPTION



Modern Plywood Holder is a product that facilitates plywood transfer work. The objective of this product, one of the point is to reduce the workforce while the work is being done. which is a commonly used method for lifting plywood using more than one workforce. The dimension of this product: length (92 cm), width (62 cm), and height (74 cm). The maximum number of plywood that can be carried is according to the thickness of the plywood. Maximum thickness of plywood that can be carried: (9cm). Next, the height and width of the tool can also be adjusted to the required height: (24cm) and width (46cm) according to the plywood size. Besides that, the range weight that the tool can loaded is around: (100kg). Moreover, the special feature of this product are portable, space saving and transportable. Besides that, other than workers this product can also be used by the public to perform plywood transfer work.

CHAPTER 1

INTRODUCTION

1.1 INTRODUCTION

Plywood is a commonly used building material product in the world. Plywood is often used in furniture making and home construction. It has many types, weights and sizes. As a result, there are difficulties faced by workers in moving plywood from one place to another. The standard method of lifting plywood commonly used by workers is the conventional method. There is a problem when an employee lifts a plywood using conventional methods that cause injury to the worker. Based on this problem we came up with an idea to design a tool that could help workers do plywood transfer work. In addition, it can reduce the problem of spinal cord injury among workers.

1.2 BACKGROUND OF THE PROJECT

Ergonomics (or human factors) is the scientific discipline concerned with the understanding of interactions among humans and other elements of system – by International Ergonomics Association. The severity of Ergonomic Hazards often depends on the level of exposure over time. Injuries sustained from these hazards can be anything from sore muscles to long-term illnesses. Ergonomic Hazards include, frequent lifting, poor posture, awkward movements, especially if they are repetitive and using too much force, especially if it's done frequently. Ergonomic Hazards are often a result of the way a space is designed, meaning that planning ahead and thinking about how employees interact with their work space is crucial.

Workplaces that require workers to lift heavy loads can contribute to injury and cause them illness. The effect is Occupational Muscular Skeletal Disorders OMSD disease. OMSD is a condition that interferes with the function of joints, ligaments, muscles, nerves and tendons, and spine. The result of this illness will cause pain and

reduce the ability to move in daily routine work. OMSD disorders can affect every part in the body. The main parts include neck, shoulders, wrists, buttocks, hips, knees and legs. Among the risky illnesses caused by lifting excessive weight burden are spinal pain such as slip disk and injury risk resulting in dislocated ligament, muscle or tendon strained and muscle tension.

According to statistics published by the social security organization of PARKESO, the highest number of compensation in 2014 increased compared to 2012. In 2012, 448 cases were recorded while in 2013 the number of cases was increase 517 cases and the highest number was recorded in year 2014 with 675 cases. Most of these cases are associated with spinal pain.

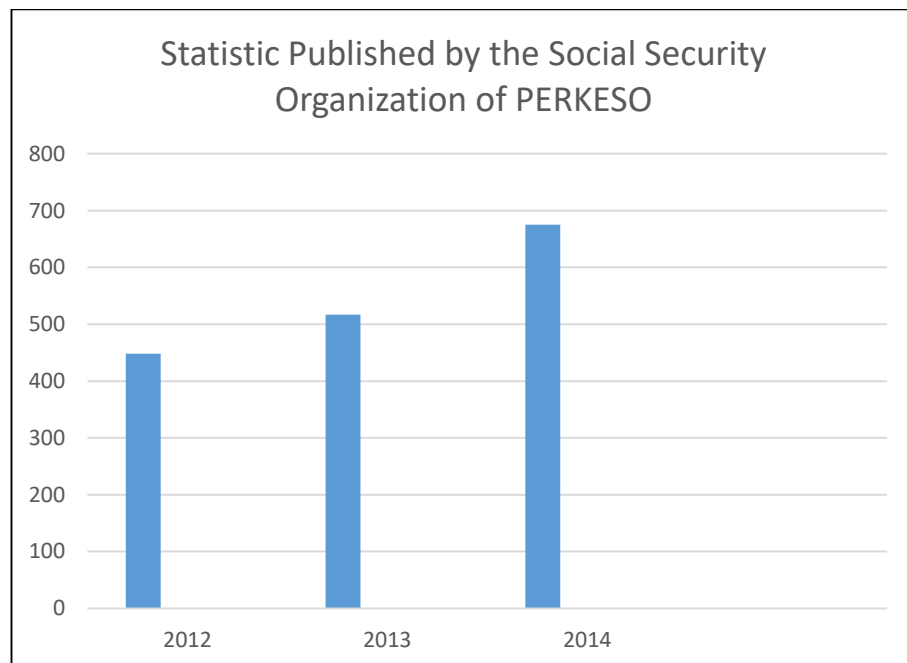


Figure 1.1: Statistic published by the Social Security Organization of PERKESO

1.3 PROBLEM STATEMENT

The problem statement that can be identified in the work of lifting plywood at the plant or wherever the place is the process of lifting, dropping and carrying things directly without the aid of equipment can be a risk factor for injuries to workers such as spinal injury. Additionally, when workers lift conventional plywood, the workforce is in an abnormal state, which will cause injury to the spine and injuries caused by plywood bark debris when lifting. By lifting plywood conventionally will also employ a lot of labor. at least two or three people are required to lift plywood. Finally, plywood designs of various sizes cause many unexpected and difficult events.



Figure 1.2: show a worker lifting plywood using conventional method

1.4 OBJECTIVE OF THE PROJECT

1. To do the job of lifting plywood that facilitates work.
2. To identifying the time saving rates obtained when using the Modern.

1.5 SCOPE OF THE PROJECT

Based on our research, there are three scopes for Modern Plywood Holder there are hardware store, warehouse and workshop around Shah Alam. Sometime the quantity of plywood purchased by the customer exceeds the capability of the workers at the hardware store, warehouse and workshop to lift it. There are also workers who use conventional methods to lift plywood without knowingly causing the risk of accidents. So as a solution we get an idea to create a tool to reduce the risk of injury to employees at the hardware store. In addition, the use of many labor. To lift a plywood

unit requires two or three workers to lift it but with the tool we created a worker is sufficient to lift one plywood unit. Furthermore, reduce the time can be obtained if employees use Modern Plywood Holder rather than conventional methods to move plywood from place to place

1.6 IMPORTANCE OF THE PROJECT

This equipment has an impact on communities, organizations and countries to help facilitate the lifting of plywood. Among the benefits of this project is to reduce the force or the excessive workforce employed during work. Additionally, it can prevent a worker from risking injury while doing a plywood transfer work. This tool is designed to help employees work in neutral/ normal postures and can minimize static loads and benefits while working.

1.7 CHAPTER SUMMARY

As a conclusion, based on our research, we know that the workers have a problem in plywood handling from one place to another. After that, this problem needs to be addressed now as more and more people are getting side effects like body aches. If such a thing is left, it will further increase the issue of workers who do not want to risk a heavy job. So we introduce our products to further improve the quality of the work. Our solutions are better than alternative ideas because these designed products have safety features compared to manual pitch lifting methods. In the end, our suggestion for further action can be taken in the direction outlined above. The products produced can attract interest in the work sector both within and outside the country. We hope this product will become an important element in a place of work and can be used everywhere.

CHAPTER 2

LITERATURE REVIEW

2.1 INTRODUCTION

In implementing a project, it is important to conduct a study on the material to be used to complete the project. Literature review needs to be carried out before designing this project to ensure that it achieves the objectives and achieves the best solution in strengthening our product. Modern Plywood Holder is one tool used to lift plywood from one place to another place. This chapter describe the main components used in producing this project. Besides to overcome this problem, a detailed study has been done to ensure the best method for inventing this invention.

2.1.1 Ergonomic

In doing this plywood lifting work there are problems like ergonomic effects caused by certain factors. Referring to the Journal "The Role of Ergonomics in Occupational Safety and Health", Ayodhya, Telkom University, Ergonomics is the science, art and technology application to harmonize between all the facilities used in the activity or work with human capabilities and limitations both physically and non physical so quality overall life is better. Ergonomics or also known as Human Factors Engineering is a discipline that always places human beings at the center of attention (human centered design) holistically and integratively in a work system where humans engage in them.

According to International Ergonomics Association (IEA), ergonomics is defined as:

“The scientific discipline concerned with the understanding of interactions among humans and other elements of a system, and the profession that applies theory, principles, data and methods to design in order to optimize human well-being and overall system performance”

(IEA, 2015)

2.1.2 Work Safety

Referring to the Journal "The Role of Ergonomics in Occupational Safety and Health", Ayodhya, Telkom University, Safety comes from English which is a word of safety and is usually associated with the condition of a person from accident or near accident. . As a matter of facts safety as a scientific approach and as a practical approach to studying factors that can cause accidents and attempt to develop ways and approaches to minimize the risk of accidents.

2.1.3 Occupational Muscular Skeletal Disorders (OMSD)

Musculoskeletal disorders (MSD) are injuries or disorders of the muscles, nerves, tendons, joints, cartilage, and spinal discs. Work-related musculoskeletal disorders (WMSD) are conditions in which:

1. The work environment and performance of work contribute significantly to the condition; and/or
2. The condition is made worse or persists longer due to work conditions.

In 1997, the Centers for Disease Control and Prevention's (CDC) National Institute for Occupational Safety and Health (NIOSH) released a review of evidence for work-related MSDs. Examples of work conditions that may lead to WMSD include routine lifting of heavy objects, daily exposure to whole body vibration, routine overhead work, work with the neck in chronic flexion position, or performing repetitive forceful tasks.

2.2 CONCEPT/THEORY

After identifying the problem, the advantages of research, objectives, scope and terminology, literature review will be conducted first to ensure further steps can be taken. In this chapter we will discuss terms related to the project to be carried out. Concepts and theories will also be explained about this project. This term is very important to know and understand before a more detailed description of our project titled "Modern Plywood Holder"

The "Modern Plywood Holder" consists of stainless steel, tires, soft rubber, and flexible. This project has the primary purpose of reducing the risk of illness and accelerating the carrying and measuring work. Each of these terms will be explained in the concepts and theories of literature review.

2.2.1 Concepts

Exemplary ideas or interpretations of concrete events. The concept also means as a result of projects, processes or anything else out of the language, used by reason to understand other things. Abstract is a universal thing that refers to a category or class of things or events, or relationships. Understanding the concept itself is universal where it is usually used extensively for every addition.

“Modern plywood holder” is a tool for lifting plywood from one place to another. The concept of this tool is to facilitate transfer work and plywood lifting work. In addition, reducing the use of excessive workforce and save time during the process of lifting or moving plywood in certain places such as factories, hardware, warehouses and construction sites. In addition, this product uses a flexible concept where the tool is designed with a foldable design. Due to its flexible design, the tool is easy to store and carry anywhere.

2.2.2 Theory

Opinion based on research and discovery, supported by data and discussion. This theory is also an analysis of the relationship between one fact and the other facts that will be collected and made into data. Theoretical statements are generally accepted temporarily and not conclusive definitions.

2.3 PREVIOUS REASEARCH

History and description of the uses to which bent plywood has been put to in the past. Surprisingly the first patents on plywood go back to 1895, just about the time that the steam engine was becoming powerful enough to spin a log against a slicing knife. Continuing the history through World War II talks about (and shows pictures of) plywood air planes. The middle section is on the production of the plywood furniture, it starts with the bare logs and how they are cut into veneer and finally put into bent-ply furniture. It talks about a bent ply desk designed by Mr. Pfeiffer. This desk has

veneer made in Latvia, the assembly of the desk is in Italy, and it is produced for the American market. The last section of the book shows a wide selection of furniture articles, illustrating what can be done with bent ply. Plywood is arguably the most modern design artefact: it is a material born of natural wood and formed by vigorous industrial processes that can assume the most organic of shapes through bending, laminating, and moulding. Plywood truly fulfils that most modern of dreams: bridging the gap between technology and nature. Bent Ply is the first book devoted to plywood in modern design. The book consists of two parts: the first, an illustrated history of plywood (tracing its origins to ancient Egypt).

2.3.1 History of plywood use.



Figure 2.1: Belter chair, about 1860

The back of this chair, manufactured in around 1860, is surprisingly made of moulded plywood. It was made according to a technique for moulding furniture that was patented in New York in 1858 by John Henry Belter. His technique greatly increased the speed of manufacture and reduced production costs as chair backs could be made in batches of eight using a single mould.



Figure 2.2: Elevated plywood railway, 1867

In 1867 a 107-foot long prototype elevated railway, made entirely as a moulded plywood tube, was exhibited at the American Institute Fair in New York. Seventy-five thousand people rode this extraordinary train, which was propelled by large fans. The designer, Alfred E. Beach, planned for the railway to be installed across the city, raised above the streets either on columnar supports or attached to the sides of buildings. Plywood's strength and lightness made it a good and cheap alternative to an underground railway of cast iron.

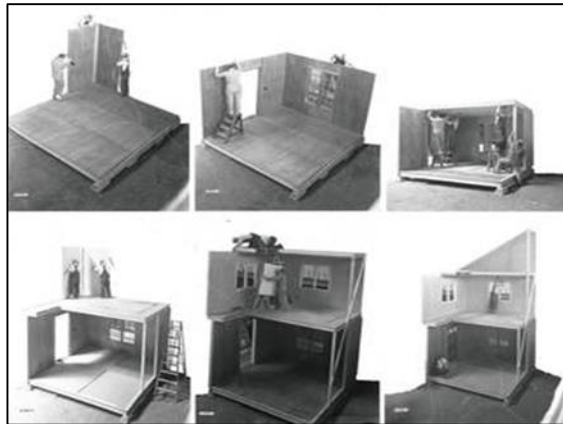


Figure 2.3: Forest Products Laboratory (FPL) house, 1937

In the United States schemes to create cheap, factory-produced houses flourished during the 1930s. This was motivated by high unemployment, small household incomes and a shortage of low cost housing during the Great Depression. Designs for prefabricated houses focused on quick fabrication and easy disassembly. Plywood was perfectly suited to standardised, lightweight panel systems which could be factory-produced and assembled on site. The invention of synthetic glues in the mid-1930s also meant that plywood manufacturers could produce new waterproof plywood, ideal for exterior use.



Figure 2.4: Mosquito aeroplane, 1941

Plywood's most technologically significant use from the 1910s to 1945 was as a material for aeroplane design. Its strength and lightness allowed for the construction of radical new planes that revolutionised the nature of flight. In the early 1910s, ground-breaking experiments with moulded plywood allowed for the construction of the first enclosed, streamlined aeroplane fuselages.



Figure 2.5: Open desk, 2013

Plywood is one of the most common materials of the digital age. Makers and designers share plywood projects around the world, either by distributing digital cutting files for CNC (Computer Numerical Control) machines, or with videos and images posted online.

The company Open desk holds no stock and operates entirely online. Under a system of distributed manufacturing their designs can be downloaded anywhere in the world for cutting on a CNC router – a computer controlled machine that cuts with a rotating bit called an end mill. Individuals can make the furniture themselves, or be put in touch with a local maker. Virtually all Open desk designs are plywood. The material was chosen after balancing cost, availability and global standardisation, to ensure uniform construction.



Figure 2.6: Charles and Ray Eames designs, 1940s

American designers Charles and Ray Eames experimented with plywood during the Second World War, developing a method for moulding complex curved forms. In 1942 they designed a lightweight, stackable moulded plywood leg splint for the US Navy. Later in the war they went on to make plywood parts for aircraft.

The Eames's design for the DCM (dining chair metal) with its three-dimensionally moulded seat was greatly influenced by their wartime work. It was one of the most influential chairs of the second half of the 20th century and was imitated and adapted by designers around the world. British designer Robin Day said of the period: "Every designer I knew had a picture of the Eames chair [the DCM] pinned to their drawing board".

2.3.2 Plywood.

Before starting this project as well as about the dimensions of the plywood itself should be identified. Plywood is made of several thin wood layers that are coated together. The plywood sizes commonly found in the market are 1220mm and 2440mm. Plywood thickness is between 3mm to 32mm. Plywood can be found in two forms such as the following: waterproof type and not waterproof type. Plywood is widely used for making furniture, room walls, doors, shelves and boxes. The advantages of plywood are as follows: light and easy to use, wide and flat surfaces, not easy to shrink and warp and not easily broken when nailed or screwed. The disadvantages of plywood are as follows: wood layer is easy to peel when exposed to water and there is no small size and less economical if it only requires a small size. The surface of the plywood is coated with a formica or plastic coating that is available on the market.

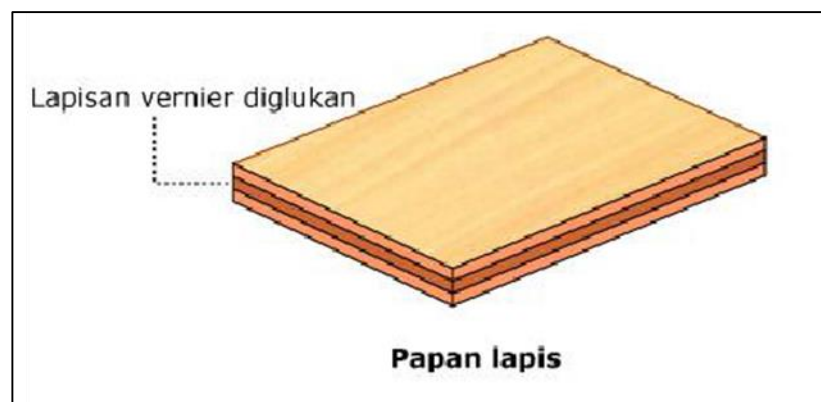


Figure 2.7: Plywood Layer.

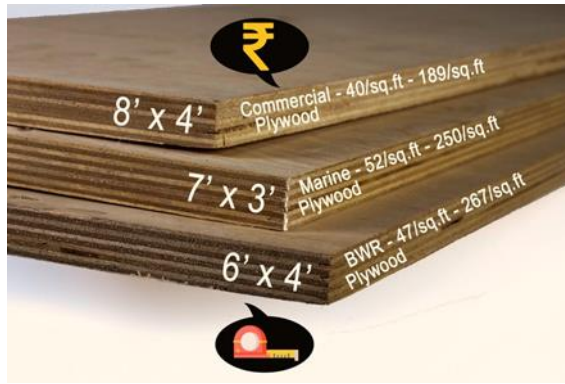


Figure 2.8: Dimension of Plywood.

In accordance with GOST, 4 grade plywood is distinguished:

Grade	Description
First class	Small defects are allowed on plywood sheets.
Second class	Contain patches that have been repaired, cracked, or cracked glue.
Third class	The presence of knots on the surface, wormholes, but the defective amount should not exceed 9.
Fourth class	has very low quality and has a large number of defects (collecting knots, a large number of wormholes, uneven edges)

Table 2.1: Grade of plywood

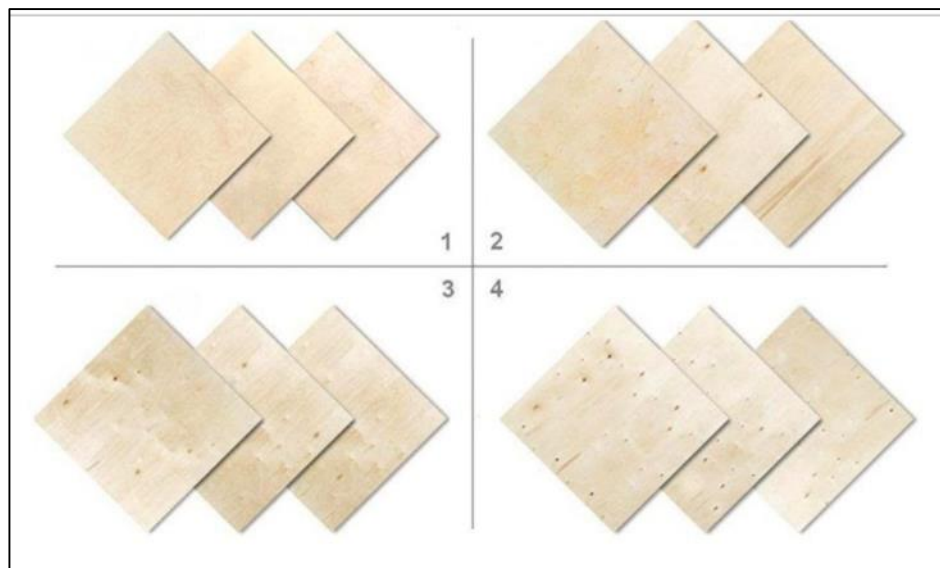


Figure 2.9: Grade of Plywood.

2.3.3 Method to lift plywood

That have some method to lift plywood. Techniques without using this conventional tool or method are carried out without the help of other equipment and it uses only energy.

i. Carry plywood with a Loop of Rope.

A standard sheet of plywood is 4'x8' and weighs anywhere from 25 to 85 pounds, depending on the thickness. The dimensions make a sheet awkward to carry alone. This method is to make it a bit easier to carry the plywood with a length of rope. Rope are tied up at the ends together to form a loop, hook the rope around two corners of the sheet, and grab the middle of the rope like a handle, this method uses energy so it can't lead at long distance and it also suitable use in private work. **Figure 2.10** show how to carry plywood with a loop of rope.



Figure 2.10: How to carry plywood with loop of rope.

ii. Carry plywood with two persons.

The method of lifting plywood using these two people is the same as lifting using conventional methods. this way of lifting takes a long time to complete the lifting of plywood from place to place. This method also requires a lot of workforce.



Figure 2.11: Method to Carry plywood with two persons.

2.3.4 Project research that available in the market.

i. Gorilla Gripper

This tool can carry large panels of wood or drywall. It clamps onto the top of the panel and provides a handle that lets to carry the large slabs right at side. No more straining back. This tools just use one person to carry plywood. But it has a limits, it just can carry one panels or plywood in one use and it use energy to lift it. The Gorilla Gripper self adjust to any with panel, and work with a ton of different types of material, including wood, drywall, glass panels, metal sheets, metal sheets, particle board, melamine, large, signs and more.



Figure 2.12: Gorilla Gripper

ii. Panel Carry Handle

This tool is commonly used to lift plywood by requiring only one people in its use to lift plywood. this tool has Dimensions: -14 " handle for extra reach and this tool has a maximum power of 80kg to accommodate the load. The advantage of this tool is that it helps transport building boards and other flat materials with ease, better balance and control, better visibility while carrying and angled handle keeps hands away from panel for comfort.



Figure 2.13: Panel Carry Handle

2.3.5 Study material used

a) Hollow Steel

Hollow steel is more accurately described in the shape of a hollow long hollow pipe with a rectangular shape so often called the 'pipe box'. Hollow steel is actually a hollow structural section. The type of iron extracted in this HSS Iron group can be round, elliptical, square, and rectangular. Hollow steel has many uses. for example, as the main material in the installation of gypsum panels or GRC panels. Because of its shape like straight pipe box, it is widely used as interior material and furniture.

i. Hollow Structural Steel Tube.

- HSS rectangular tubes and square tube terms.

Outside Dimensions: The outer measurement of each side (see “A & B” in the diagrams below).

Wall Thickness: The thickness of the tube wall (“C”).

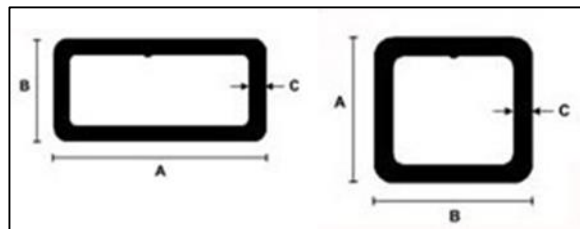


Figure 2.14: Rectangular tubes and square tube

- HSS round tube terms.

Outside Diameter: The measurement of the outer diameter of the tube (see “A” in the diagram below).

Wall Thickness: The thickness of the tube wall (“B”).



Figure 2.15: Round tube.

ii. There are two type of hollow iron, that are:

- Hollow Steel Galvanise

This steel is a finishing coating of 97% element of coating zinc and 1% of aluminum coating element and the rest of element of other material. For the application of hollow steel this one should be given anti rust and kind of good paint to hold longer even later in the rain and heat.



Figure 2.16: Hollow Galvanise

- Hollow Steel galvalume

This Galvalume is a nickname for Zinc-Alume whose coating process contains aluminum and iron elements. When viewed from its composition, hollow galvalume also has a better resistance to corrosion or corrosion than galvanizing. Because of this good quality then the price of galvalume will also be more expensive than galvanise.



Figure 2.17: Hollow Galvalume

The steel hollow products produced and manufactured by each of these plants will have different qualities. Therefore, the price for each type of hollow steel also different. The better the quality is then the price will be more expensive too. However, the hollow steel sold in this market certainly has a standard size. It is known that from the various types of hollow steel the box is 6 meters wide but the thickness is different from 0.6 mm, 0.7 mm, 0.8 mm, up to 1.7 mm.

Hollow steel has standard size. Measurements or hollow dimensions such as Figure below:

Ukuran	Berat (Kg)	Ukuran	Berat (Kg)
40 x 40 x 2 mm x 6 Meter	14,45	60 x 60 x 3 mm x 6 Meter	33
40 x 40 x 2,3 mm x 6 Meter	16,6	60 x 60 x 3,2 mm x 6 Meter	35,17
50 x 50 x 2 mm x 6 Meter	18,21	75 x 75 x 2 mm x 6 Meter	27,63
50 x 50 x 2,3 mm x 6 Meter	20,94	75 x 75 x 2,3 mm x 6 Meter	32
50 x 50 x 2,5 mm x 6 Meter	22,77	75 x 75 x 2,5 mm x 6 Meter	34,53
50 x 50 x 2,7 mm x 6 Meter	25	75 x 75 x 3,2 mm x 6 Meter	44,19
50 x 50 x 2,8 mm x 6 Meter	25,5	100 x 100 x 3,2 mm x 6 Meter	59,28
50 x 50 x 3 mm x 6 Meter	27,32	100 x 100 x 4,5 mm x 6 M	83,37
60 x 60 x 2 mm x 6 Meter	22	125 x 125 x 3,2 mm x 6 M	74,36
60 x 60 x 2,3 mm x 6 Meter	25,26	125 x 125 x 4,5 mm x 6 M	104,56
60 x 60 x 2,5 mm x 6 Meter	27,5	150 x 150 x 4,5 mm x 6 M	125,76
60 x 60 x 2,8 mm x 6 Meter	30,77	150 x 150 x 5 mm x 6 M	139,73

Figure 2.18: Measurements Hollow Steel

b) Wheel

The wheel is a circular device capable of tracing its axis (axle) and thus facilitating movement or transport by digging. In addition, the wheels can also be used to work through machines. Common examples can be found in transport. more generally, the term is also used for spinning or rotating round objects, such as pottery, ship steering wheel.



Figure 2.19: Type of wheel

i. Rubber Bonded Wheels

Our range of Rubber Bonded Wheels is quiet in operation and absorb shock and vibration. They find their utility best suited to the applications where a light-weight wheel is needed without loss of load capacity.

Advantages of Hot Pressed Rubber Bonded Wheels:

- Outstanding high quality surface finish
- Dense bond structure, therefore:
- Excellent profile holding capabilities
- Absolutely no burn
- Long life wheel
- Ability to run at high peripheral speeds
- Better stability and more economic than industry standard resin bonded wheels. Main Applications:

- Flute grinding with CNC grinding machines



Figure 2.20: Rubber Bonded Wheels

c) Oriented Strand Board (OSB)

Oriented Strand Board is a widely used, versatile structural wood panel. Manufactured from waterproof heat-cured adhesives and rectangularly shaped wood strands that are arranged in cross-oriented layers, OSB is an engineered wood panel that shares many of the strength and performance characteristics of plywood. OSB's combination of wood and adhesives creates a strong, dimensionally stable panel that resists deflection, delamination, and warping; likewise, panels resist racking and shape distortion when subjected to

demanding wind and seismic conditions. Relative to their strength, OSB panels are light in weight and easy to handle and install.

OSB is produced in huge, continuous mats to form a solid panel product of consistent quality with no laps, gaps, or voids. Finished panels are available in large dimensions, minimizing the number of joints that can "leak" heat and admit airborne noise.



Figure 2.21: Oriented Strand Board

2.4 CHAPTER SUMMARY

In summary, this Section collects all observations and data obtained through interviews, magazines, catalogues, books and internet resources. A clear description of each section and the question of the project has been described in this chapter. Various blasting ideas, theories and source of references have been widely used on the internet as our main source. All filling in the literature review section is based on the deeds mentioned in research studies that have taken place and are available online over the past 5 years. Long research has proved to us that so many applications are relevant to our topics and projects. This literary study gives us the opportunity and experience to communicate with officials and companies to make our main reference with only our high courage and confidence. This section also explains the concepts and theories of our study.

This section also explains various ways of overcoming problems and ideas as inspiration to continue our project. We hope our project will be useful in various angles or scope of work.

CHAPTER 3

METHODOLOGY

3.1 INTRODUCTION

The research methodology is the method or procedure used to implement the project in detail. The purpose of the methodology is to find out the method used by the students to prepare the product successfully at the designated time.

In producing project, some steps need to be taken before the project is completed. This step should be done with care to produce a quality project.

This chapter also discusses the methodology of the study conducted to ensure the conduct of a more systematic study and towards achieving the objectives and objectives in producing the tool for the lifting of the "Modern Plywood Holder" plywood is achieved. This chapter will also discuss in detail some of the important thing in the methodology and the strategies used in preparing this study include:

- i. Research design
- ii. Data collection methods
- iii. Instrument studies
- iv. Sampling technique
- v. Data analysis method

3.1.1 Research methods

Structured research methods and strategies are very important in carrying out products to ensure that projects can be produced by meeting the criteria. Additionally, every method or way are used must be related to product production.

3.1.2 Project flow chart

Figure 3.1 below shows an overview of the aspects in terms of design and analysis. This chart is as a general reference.

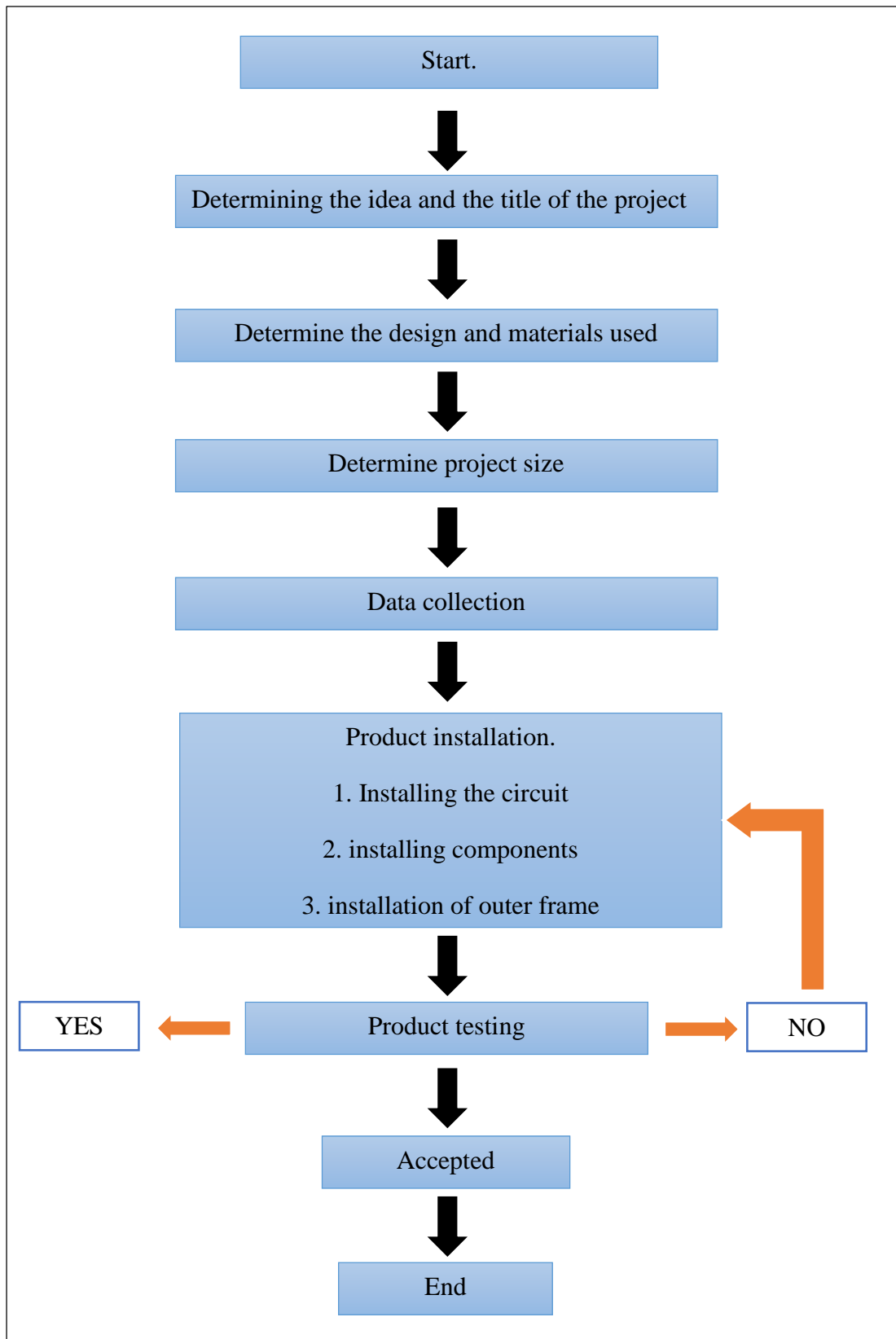


Figure 3.1: Flowchart Of The Project

3.2 RESEARCH DESIGN

Design is one of the material arrangement to produce quality products and have a good value for easy use. Design selection has several factors to consider:

- i. Function that is a task, work or role in forming a form to solve the problems faced by the worker and facilitate work.
- ii. The designs are tailored to the work activity and meet the user's taste and more practical.
- iii. Manufacturing materials are taken into account in terms of the type of materials used to produce a quality and durable product. Material sources for easy-to-use product making, utilizing used goods, easy to operate, cost effective materials due to long life and affordable production cost.
- iv. Ergonomics are emphasized in the production of products to benefit consumers. The design can be adjusted according to the needs of users in performing the work and user-friendly activities.

Before starting a product installation, the design must be made with hand painting, autocad drawing or sketchup. The purpose is to facilitate and guide before producing a product.

For "Modern Plywood Holder" products, design drawings are created using a computer software called sketchup. This software is in accordance with their respective requirements. The painting for "Modern Plywood Holder" design has been designed with sketches of the front and back view. Examples of drawings can be seen in the diagram below:



Figure 3.2: Sketchup of the "Modern Plywood Holder" product from the front view.



Figure 3.3: Sketchup of the "Modern Plywood Holder" product from the back view.

3.3 DATA COLLECTION METHODS

Data collection methods are intended to demonstrate that the issues stated are true and also require a solution to facilitate a person. Data collection methods can be carried out in various ways to obtain information. The methods are as follows:

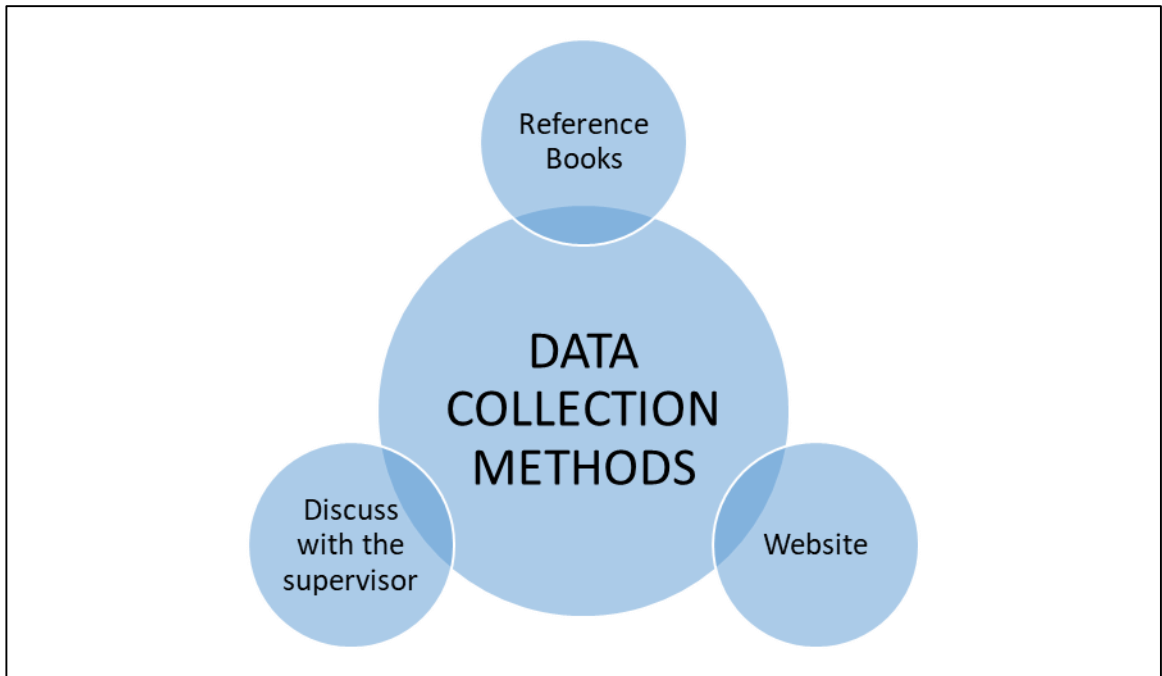


Figure 3.4: Data collection method

3.3.1 Reference Book

The reference book is the first method used to get information related to visiting nearby libraries so that the information obtained enables the objective and scope of the research to be determined by the research title.

3.3.2 Discuss with supervisor

Discussions with supervisors are a process that needs to be done before a process is executed. Meetings should be held at least once a week with supervisor Pn Sarah Afzan Binti Abd Karim to conduct deliberations and planning to get better results. Supervisors can also contribute ideas in improving the ideas that the students have acquired.

3.3.3 Website

Surfing the internet is the second method used to get the information you want. It is the way to get the most easily used information nowadays. Through this method, information related to the continuation of the study title and objective of the study can be obtained easily and accurately.

<https://www.bharian.com.my/hujung-minggu/lain-lain/2018/02/392411/kesan-ergonomik>



Figure 3.5: Newspaper clippings on ergonomic effects.

3.4 STUDY INSTRUMENTS

In this research instrument, the questionnaire was selected. Respondents' selection consists of residents of Shah Alam Polytechnic and outsiders. The questionnaire used was the choice of answer (yes / no / possible)

The questions included in the survey are based on the objective of the study on the respondents' perspective on modern plywood holders.



Figure 3.6: Research instrument

Above is our research instrument, the following pie chart shows the percentage of 73 random responses from Shah Alam polytechnic and outsiders (yes / no).

3.4.1 Manufacturing method



Figure 3.7: Iron cutting proses for plywood structure.

After making measurements and designs, the picture above shows the cutting process for our main material is steel to produce our product by using a blender.



Figure 3.8: process of making a plywood base.

For the next installation, we weld the hollow steel on the project for the base of plywood. It can be pulled out along the length of 46cm intended to withstand the plywood layer.



Figure 3.9: Install a wheels.

In this process, we are installing flexible tires under the plywood holder for the purpose of rejecting the plywood carried. The tire used is the type of heavy duty wheels.

Advantages of Heavy Duty Wheels:

- Outstanding high quality surface finish
- Excellent profile holding capabilities
- Absolutely no burn
- Long life wheel



Figure 3.10: Make holes and put bolts and nut

In this process, we make a hole in the iron part that can be adjusted out to hold the plywood. Next, the nut is welded in every hole. After that, we put the bolt for the purpose of binding the iron on the inside.



Figure 3.11: Tidying up

The final process of laying the layers after the welding process is finished using the grinder. After that, we test the holder with the plywood.



Figure 3.12: Modern plywood holder finish.

The "MODERN PLYWOOD HOLDER" is ready for installation and testing.

3.5 SAMPLING TECHNIQUE

The sampling definition is the process of selecting elements in the population for the purpose of representing the population of a study. The selected sample at least has the same nature as the population in the investigation. A good and perfect plan process can help make generalization through hypothesis testing.

The purpose of this sampling is to minimize the cost of the study, save time and energy and get the maximum accuracy and expectation that will occur in the research.

In a research, there are two sampling methods of random sampling (random) and non- sampling. Sampling that we did at the beginning of the study was a random sampling technique of stratified. We conduct an online survey that has 7 questions related to the problem to 83 respondents. Selection of respondents is randomly selected from a group or strata that has been identified as a collection of users experiencing problems while lifting plywood. Data analysis can be divided into two parts: analytical form and analysis of quantitative analysis.

3.6 DATA ANALYSIS METHOD

This section describes the data that we get from survey by using a pie chart. The quantitative method was selected for data collection conducted using a questionnaire. Questionnaire forms are transmitted online to respondents to assist in our research and data collection.

3.6.1 Collection and analysis data

In this study, a questionnaire has been made to measure the level of acceptance among Shah Alam Polytechnic students and outsiders about the problems encountered in this study and how to solve this problem. Questions were also made to look at the perceptions and assessments provided by students and outsiders on facilitators to solve the problem in this study in an effective way. To facilitate measurement, the Likert Scale is used to examine attitudes, perceptions and respondents' attitudes towards reality. Respondents were asked whether they, agree or not with the statement given. To see respondents' assessment of this statement.

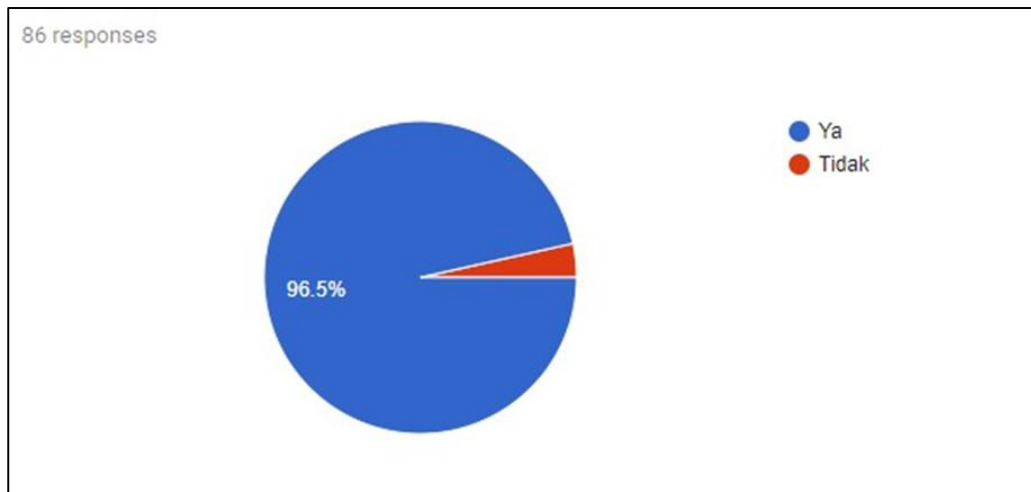


Figure 3.13: Show the data we get from 86 respondents, as much as 96.5% agree with tires to reduce labor to move plywood from one place to another.

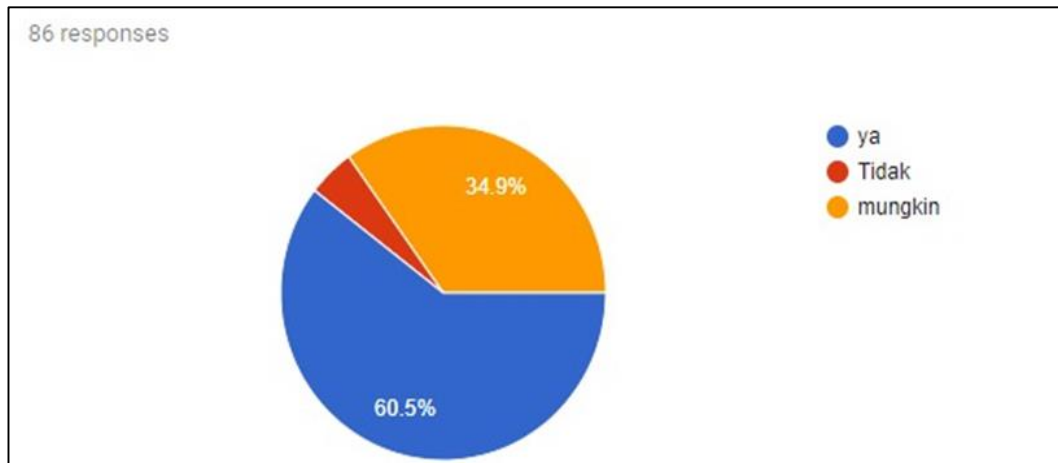


Figure 3.14: Show the response from 86 respondents, regarding the suitability of this tool for various scope of work.

This is the response from 86 respondents, regarding the suitability of this tool for various scope of work. 60.5% agrees that this tool is suitable for a wide range of work scopes while 34.9% responds to a possible response and the rest disagrees with this tool can be used for various scope of work.

3.7 CHAPTER SUMMARY

This chapter summarizes the methods and techniques for product design. In addition, collect and analyze the data obtained from the questionnaire to produce evidence that can support this study. In addition, there is a description of the problem being studied and a more detailed explanation of the methodology of this study. This course covers basic concepts and techniques in conducting research and data analysis. This includes planning of scientific experiments, analyzing and interpreting the results obtained and submitting the results of the study. Use some of the methods outlined to facilitate researchers to obtain data and information from research respondents. This is a guide to researchers in producing this study.

After analyzing data, it is important to draw conclusions or conclusions about the results and hypotheses whether the trap is effective or not. it is important to provide a comprehensive explanation of the purpose of the investigation, especially when the researcher has no full authority over the subject and respondent. All these ethics are to ensure the quality and quality of research is produced. In the early stages of methodological research, research designs, data collection methods, research instruments, data sampling techniques and data analysis methods were systematically made to support the research subjects that are more clearly described in this chapter.

CHAPTER 4

RESULTS

4.1 INTRODUCTION

The findings of this study are based on the research instrument used by the questionnaire, product testing and the obtained data collection. The results are intended to capture the amount of data that has been collected to prove that they are accurate and valid data during the product testing process. The findings of the study also touched on the effectiveness of the product through the processes and methods carried out in advance of the product.

In addition, it will also indicate that the main objectives of the product creation have been achieved to a very good degree or not. Furthermore, the findings also show the ability to create a product based on the data extracted from the product's experimental method. This chapter will also compare the values of the data obtained to prove the effectiveness of the product so that its main objectives are achieved. Finally, the results of this finding will be evidence of the creation of a product through the data collected and collected to indicate that it is a self-study finding.

4.2 ANALYSIS AND ACHIEVEMENT OF DESCRIPTION DATA



Figure 4.1: Modern Plywood Holder Products

Figure 4.1 above shows the results of a successful product called Modern Plywood Holder. This product is a combination of aluminum hollow fittings with Oriented Strand Board (OSB) and wheels to enhance product stability when used for plywood transfer work. Wheels are installed to facilitate movement by pulling and pushing the plywood in large quantities. This product weighs approximately 30 kg and covers the entire weight of the component.



Figure 4.2: Modern state of Plywood Holder when adjusted.



Figure 4.3: Modern state of Plywood Holder when tilted.

Figure 4.2 and figure 4.3 show the condition of Modern Plywood Holder when adjusted and tilted. Adjustment is installed to adjust the tool for lifting the plywood and tilted tools to easily push and pull.

4.2.1 Product specifications

	Structure	Wheel	Base
Material	Aluminium Hollow	Heavy duty	Oriented Strand Board (OSB)
Size	4cm x 4cm, 5cm x 2cm, 4cm x 2cm	4cm (diameter)	92cm x 42cm, 92cm x 62cm
Component specification	Main structure	To moving the product	To strengthen the product

Table 4.1: Specifications of Modern Plywood Holder materials.

4.2.2 Product testing

Date: 19 August 2019

Time: 5.00 p.m

Venue: Woodworking workshop and welding



Figure 4.4: Shows the load borne by the Modern Plywood Holder



Figure 4.5: Shows the tested tools.

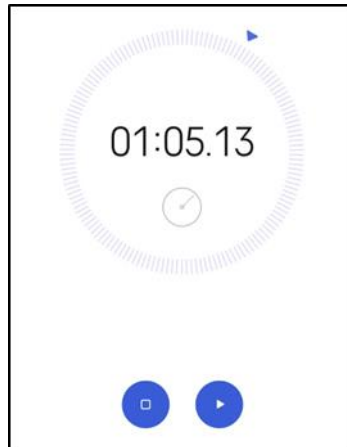


Figure 4.6: Shows the time taken during product testing

4.2.3 Product testing

Procedure Using Modern Plywood Holder

Procedure:

1. Equipment such as Modern Plywood Holder, stopwatch, plywood provided.
2. Adjust the Modern Plywood holder and transfer 4 plywood to the tool.
3. Push the tool within 7 meters and the time taken is stated.
4. Repeat the test using conventional methods using the same number of plywood and distance
5. The resulting data is recorded in table 4.2.

4.2.4 Data

Method	Distance	Time taken to complete plywood transfer work
Modern Plywood Holder	7 meter	1 minutes 5 seconds
Conventional	7 meter	5 minutes 4 seconds

Table 4.2: Product test results data.

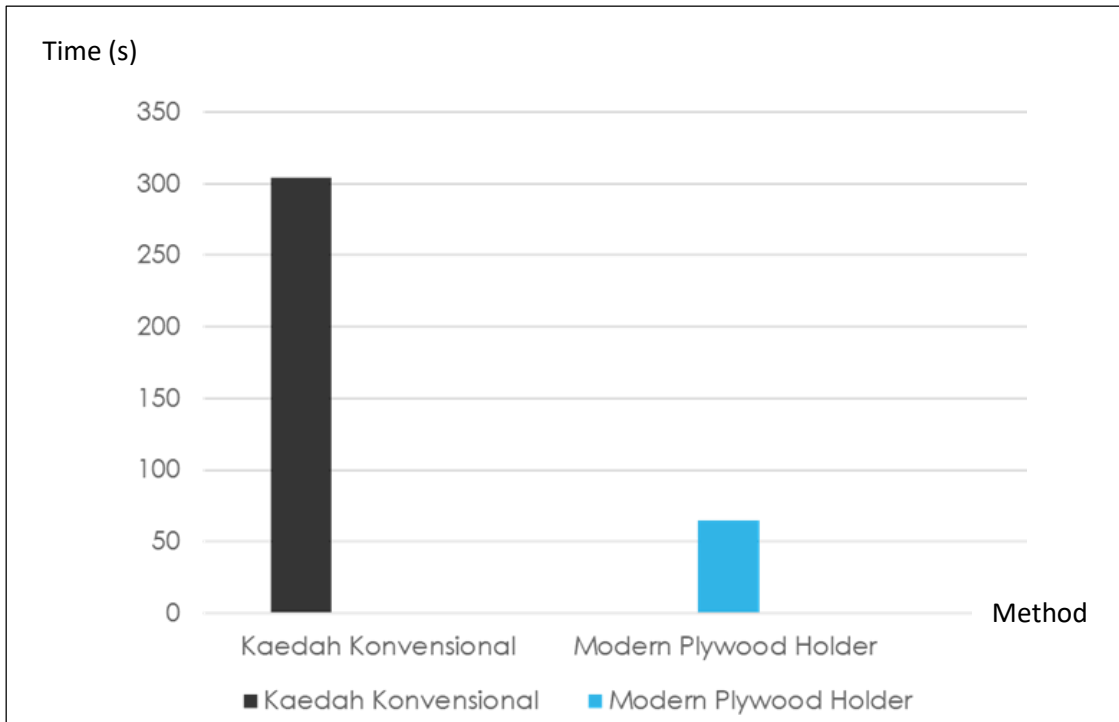


Figure 4.7: Shows the time difference it takes to complete a laminated board transfer using conventional methods and Modern Plywood Holder.

Based on the data, the time taken to complete the transfer works using two different methods, the conventional method and using the Modern Plywood Holder tool at the same distance of 7 meters and the same plywood quantity of 4 pieces. The time taken to complete the plywood transfer work using the conventional method is 1 minute and 5 seconds. Whereas the method using Modern Plywood Holder is 5 minutes 4 seconds. This is to determine the time taken to complete the plywood transfer work can be reduced using Modern Plywood Holder.

4.2.4 Questionnaire Analysis.

The diagrams below are an analysis of the questionnaire responses of woodworking workers and polytechnic students. All showed 44 respondents from among them.

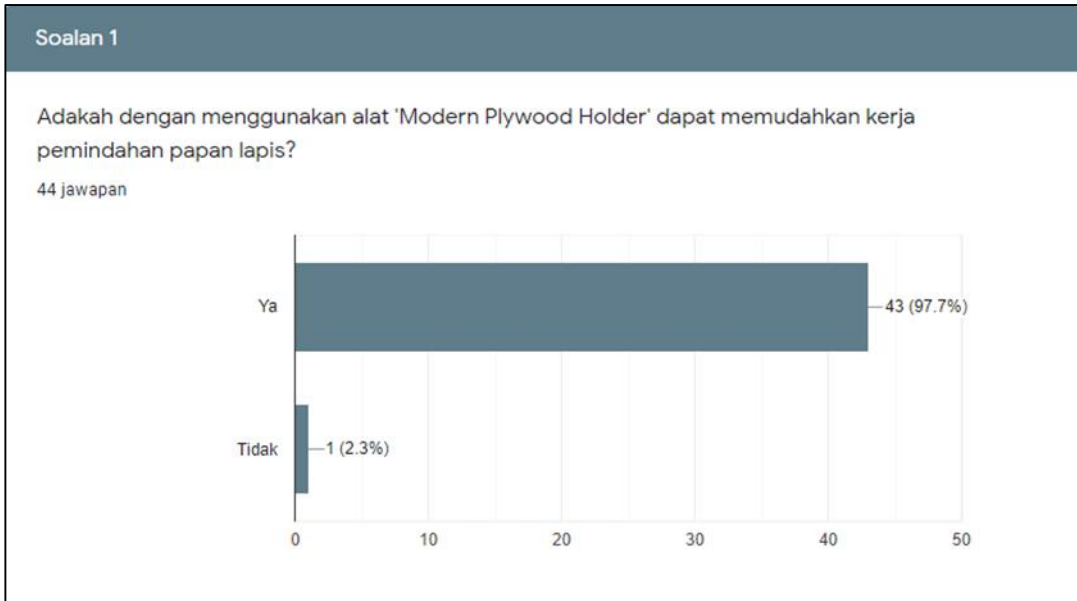


Figure 4.8: Based on the above questionnaire, a total of 43 respondents agreed that this product facilitates plywood removal. Only one respondent disagreed that this product could not facilitate the work of plywood transfer.

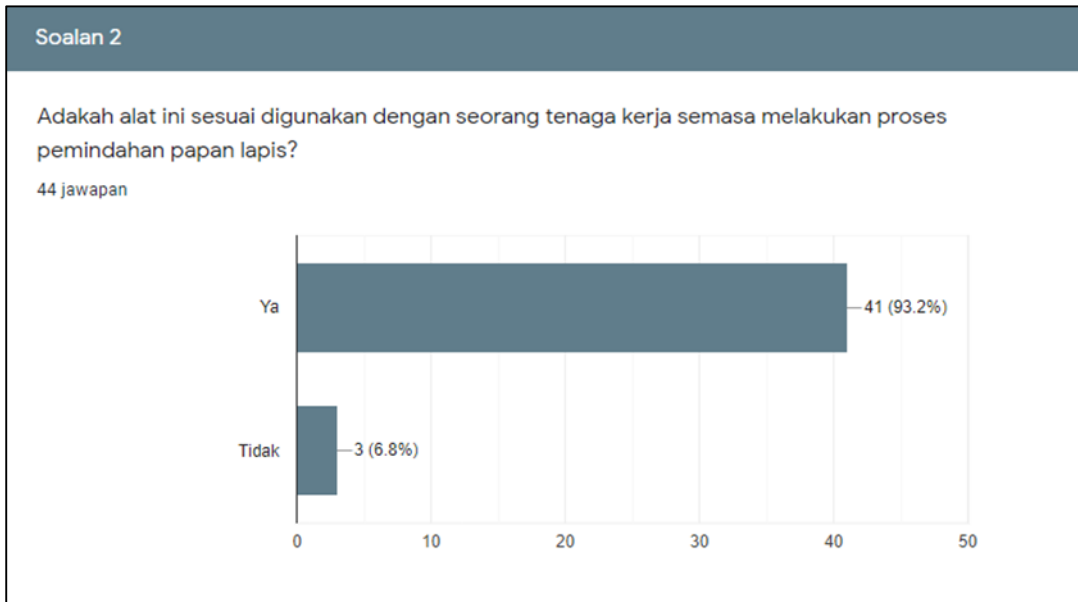


Figure 4.9: Based on the above questionnaire, a total of 41 respondents agreed that this product is suitable for use by a workforce during the plywood transfer process. Meanwhile, 3 respondents disagreed that this product was used by a laborer during the plywood transfer process.

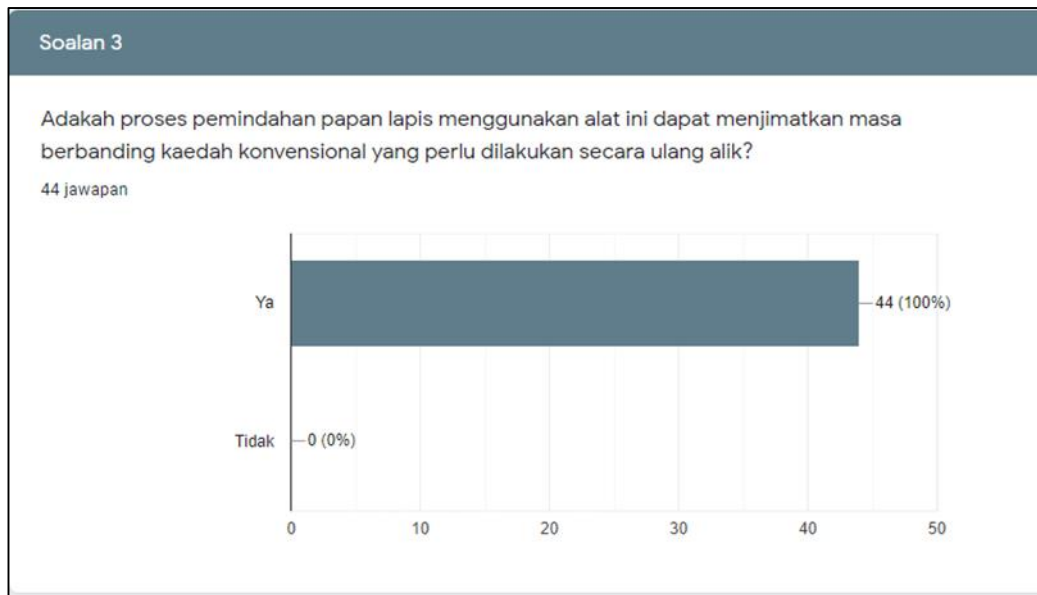


Figure 4.10: Based on the above questionnaire, all respondents agree that the process of moving plywood using this tool can save mass compared to conventional methods that need to be carried out by commute.

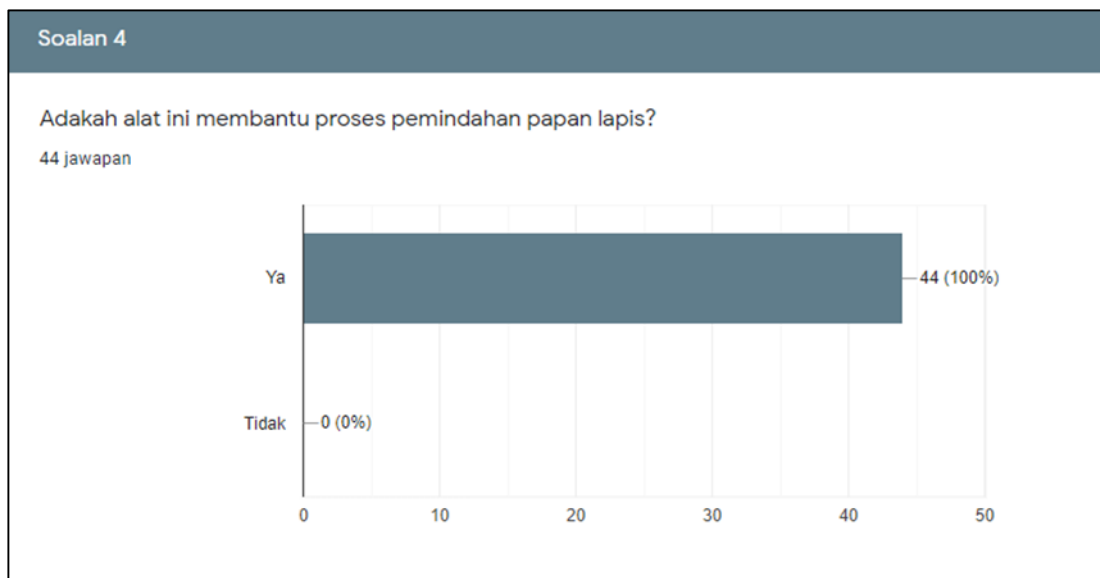


Figure 4.11: Based on the above questionnaire, all respondents agree that this tool will help with the plywood transfer process.



Figure 4.12: Based on the survey above, a total of 43 respondents agreed that the use of this tool satisfies the user during the plywood transfer process. Meanwhile, only one respondent disagreed that the use of this tool did not satisfy the consumer during the plywood transfer process.

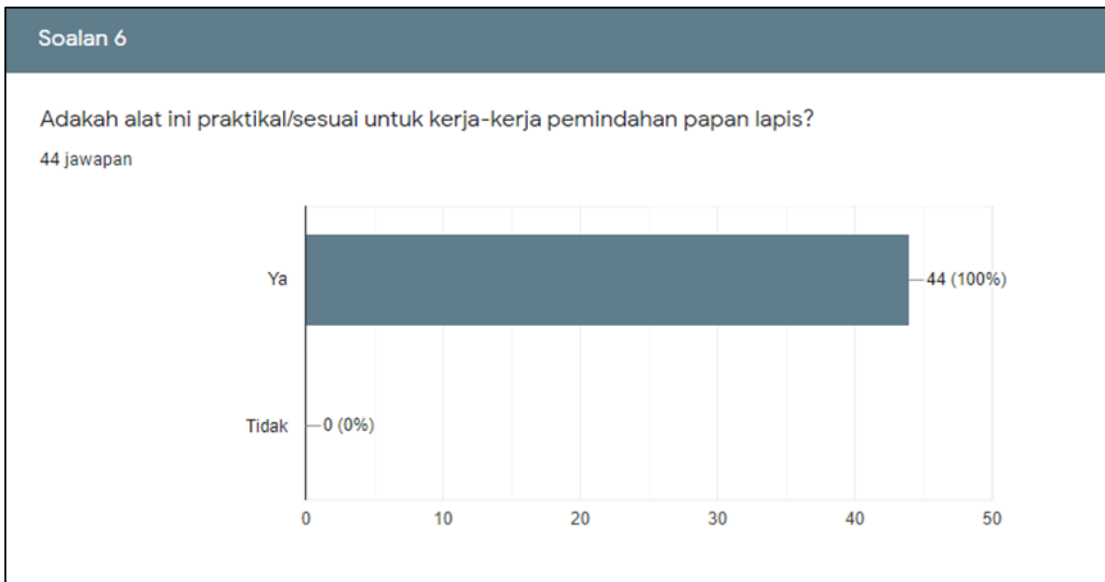


Figure 4.13: Based on the above questionnaire, all respondents agree that this tool is practical / suitable for plywood transfer work.

Soalan 7

Cadangan untuk memperbaiki alat ini?

44 jawapan

- Sangat memuaskan
- Tambah baik alat yang boleh dikawal guna alat kawalan jauh
- Kecilkan saiz alat supaya senang untuk dikendalikan
- Tukar warna bagi lagi menarik, yang lain dah ok
- Tukar material yang lebih ringan dan kecilkan saiz alat
- Kukuhkan lagi alat supaya dapat bawa beban yang lebih berat dan dapat angkat banyak lagi papan lapis
- Harga berpatutan
- Dah memuaskan
- Baiki reka bentuk alat ini kepada reka bentuk yang lebih sesuai digunakan oleh semua orang

Figure 4.14: Based on the survey conducted, 44 respondents have made suggestions to improve this tool.

4.3 ANALYSIS AND ACCEPTANCE OF EMPRICATED DATA

Conventional Method	Modern Plywood Holder
Use 2 manpower for plywood transfer process.	Only use one manpower for the plywood transfer process.
In one round only a piece or 2 plywood can be carried.	In one round 7 or 8 pieces of plywood can be carried.
The time taken to move the plywood is longer.	The time taken to move the plywood is shorter
Risk for high back injury.	The risk for spinal injury is reduced.

Table 4.3: Comparison using Modern Plywood Holder versus conventional method.

4.4 CHAPTER SUMMARY

At this stage, the questionnaire design, data collection method, research instrument, data sampling technique and data analysis methodology were systematically developed in the methodological study to identify facts and information to support the results of the study and to illustrate more clearly in this study. After data analysis it is important to draw conclusions or conclusions about the conclusions and hypotheses of whether the Modern Plywood Holder product can help facilitate the process of plywood transfer.

CHAPTER 5

DISCUSSION AND CONCLUSIONS

5.1 INTRODUCTION

This chapter describes the products that have been prepared within the specified time frame. In addition, the product created can be produced perfectly and according to the requirements and achieve the objectives. The product then undergoes several tests to obtain the necessary data such as testing the product whether it is self-tested or used by others. The results of the data obtained can serve as a source of evidence that the product being produced can assist and benefit its users. In addition, there are some disadvantages and advantages of the product that need to be improved after several tests. Therefore, some suggestions have been put forward to improve the product in the future in order to benefit its users.

5.2 DISCUSSION

This "Modern Plywood Holder" project is a product used to streamline the process of moving from one place to another, for example plywood. This product is specially designed for lifting plywood using only one workforce. This product was created for the use of wood workshops, hardware and warehouse workers, which is the process of plywood transfer.

The following is a discussion of the results obtained and the problems that arose during the survey conducted on the percentage of respondents on the difficulty of lifting plywood. Subsequently, data retrieval identifies the problems that arise and how to resolve them. The discussions with supervisor, Mrs. Sarah Afzan's Binti Abd Karim facilitated our research to achieve the 'Modern Plywood Holder' product objective.

This 'Modern Plywood Holder' design is based on an in-depth study that we have done. The materials we chose to produce this product were also selected after doing some research and several experiments. The material we chose to produce our project is the best we have ever achieved, which is both light and durable. As such, we believe the use of the 'Modern Plywood Holder' tool will help workers make the process easier.

Each member of the group also has their own tasks and complement each other to make this project a success. The existing knowledge is also shared so that all members of the group know and can learn a little about the product being developed. On the whole, commitment and cooperation are essential to carry out every task assigned.

5.3 CONCLUSION

Based on the analysis of the data obtained from the questionnaire form we can conclude that the production of 'Modern Plywood Holder' is appropriate for the workers to perform the plywood transfer process. Analyzing the data done can provide some of the benefits of the product being created.

According to the questionnaire before the 'Modern Plywood Holder' was produced, the majority of respondents agreed that conventional paddle boarding was difficult because it required two or more manpower and it took some time because the transfer process had to be done by shuttle. So it makes it easier for workers to do plywood transfer work. In addition, respondents also agreed that this product would help the plywood transfer process faster.

However, there are many problems that come with this project but we can handle it well. The tolerance and cooperation shown by each team member is key to the success of this project. Hopefully with the product being developed he will be able to assist workers in the transfer process.

5.4 RECOMMENDATIONS

Within a given times frame, we successfully completed the project. This product can operate as planned and achieve the objectives as desired and the product has been successfully tested. While this product works, it is a great satisfaction to every respondent who has used this 'Modern Plywood Holder' product. In producing this product we hope it will help the workers in the process of moving plywood from one place to another.

Generally, this product is a product of planned innovation and achieves a set objective. We also hope that future students can make even more improvements to this product so that it can be a great product and solve many problems. Several suggestions have been put forward to improve the quality of this project. These are:-

- 1) Improve the tool using the remote control to move it.
- 2) Reduce the size of the design.
- 3) Convert design material to lighter material.

5.5 SUMMARY

At the end of chapter 5, we are very proud of what we have accomplished to build a quality and useful product for the people. Solving a product is a great test for us. The project has been running on a lancer for 7 months. We find that working together is very important for us to do something. Discussions between community members should be held regularly so that each group member can present ideas to improve our project.

Besides that, our products can assist businesses in moving jobs. Our products also reduce the risk of spinal cord injury among workers in wood workshops, hardware and warehouses. We are excited to create products that help workers lift plywood.

In addition, sacrifices in terms of time and money have to be made to make this project a success. We also learned a lot from mistakes when preparing this project in terms of presenting, writing reports and entering data-related information. Patience during this project is extremely important as there may be misunderstandings between

team members or mistakes made during the project. Finally, we were able to gain new experience as we completed this project to the extent that it helped us get used to working under pressure in the future.

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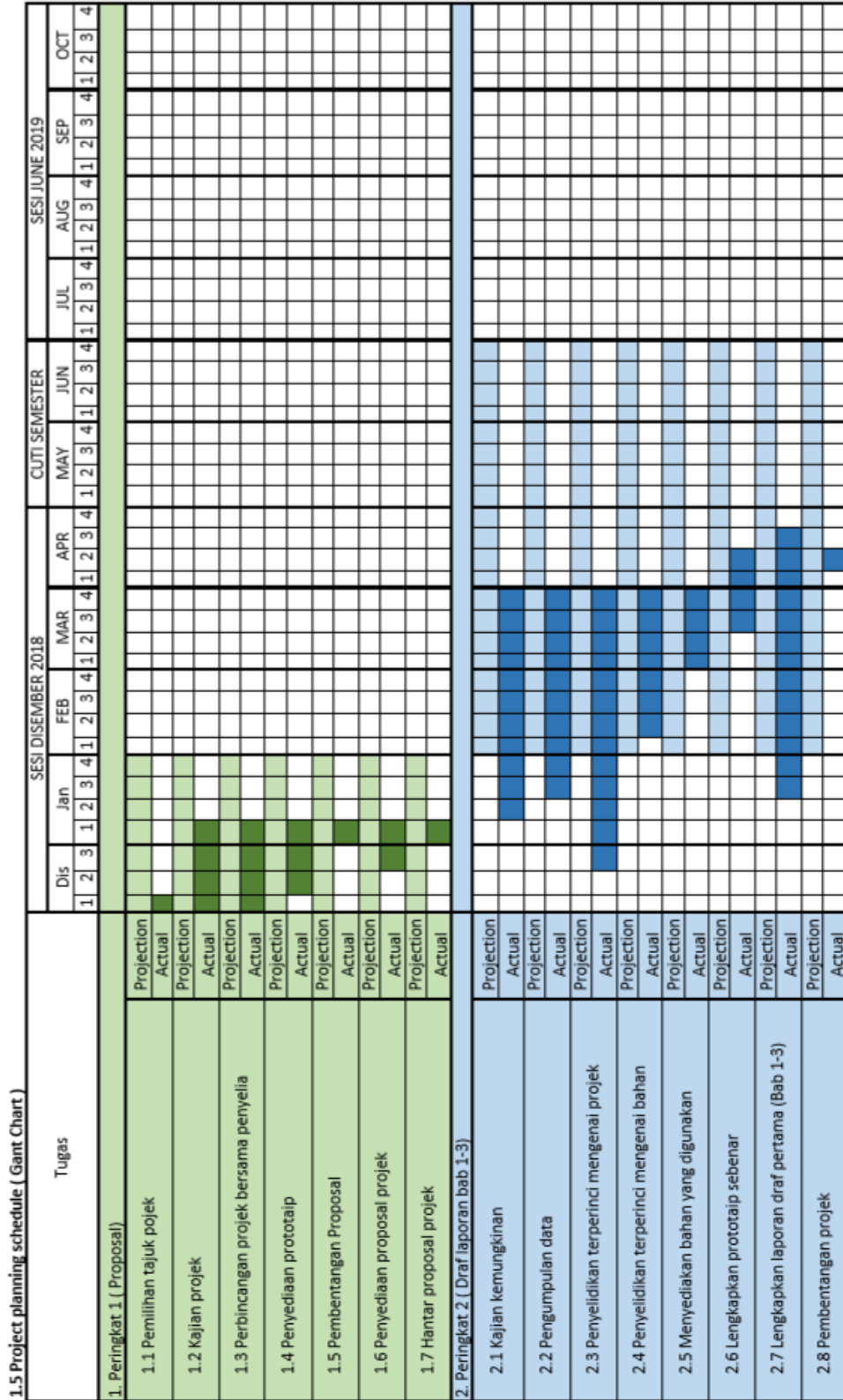
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GANT CHART



3. Peringkat 3 (Keputusan & Analisis)		
3.1 Reka Bentuk & Ujian	Projection	
	Actual	
	Projection	
3.2 Keputusan & Analisis	Actual	
	Projection	
	Actual	
3.3 Pemohonan	Projection	
	Actual	
	Projection	
4. Peringkat 4 (Laporan Akhir)		
4.1 Lengkapkan Laporan Akhir	Projection	
	Actual	
4.2 Menyiediakan Penyerahan Laporan Akhir	Projection	
	Actual	
5. Peringkat 5 (Pembentangan Projek)		
5.1 Menyiediakan bahan untuk pembentangan	Projection	
	Actual	
5.2 Pembentangan	Projection	
	Actual	

QUESTIONNAIRE

MODERN PLYWOOD HOLDER

Modern Plywood Holder adalah satu alat yang direka untuk memudahkan proses pemindahan papan lapis dari satu tempat ke tempat yang lain.



SOALAN 1

Adakah dengan menggunakan alat 'Modern Plywood Holder' dapat memudahkan kerja pemindahan papan lapis?

- Ya
- Tidak

SOALAN 2

Adakah alat ini sesuai digunakan dengan seorang tenaga kerja semasa melakukan proses pemindahan papan lapis?

- Ya
- Tidak

SOALAN 3

Adakah proses pemindahan papan lapis menggunakan alat ini dapat menjimatkan masa berbanding kaedah konvensional yang perlu dilakukan secara ulang alik?

- Ya
- Tidak

SOALAN 4

Adakah alat ini membantu proses pemindahan papan lapis?

- Ya
- Tidak

SOALAN 5

Adakah penggunaan alat ini memberi kepuasan kepada pengguna semasa proses pemindahan papan lapis dilakukan?

- Ya
- Tidak

SOALAN 6

Adakah alat ini praktikal/sesuai untuk kerja-kerja pemindahan papan lapis?

- Ya
- Tidak

SOALAN 7


Cadangan untuk memperbaiki alat ini?

PROJECT COST

No.	Material	Unit	Price
1	Hollow steel Bar 4x4 (1m)	8 unit	RM 64.00
2	Hollow steel Bar 5x2 (1m)	4 unit	RM 32.00
3	Hollow steel bar 4x2 (1m)	4 unit	RM 32.00
4	Trolley wheel with stopper	2 unit	RM 22.00
5	Trolley wheel without stopper	2 unit	RM 8.00
6	Bolt and nut	2 unit	RM 4.00
7	Screw	1 plastic	RM 2.00
8	Oriented Strand Board	2 layers	RM 47.00
9	Dolphin paint lacuer (sanding sealer	1 bottle	RM 20.00
10	Dolphin paint lacuer (clear lacquer)	1 bottle	RM 20.00
11	Spray gun (black)	1 bottle	RM 30.00
12	Paintbrushes DIY	1 unit	RM 2.00
13	Sand paper	2 pieces	RM 1.14
		TOTAL	RM 284.14

BROCHURE

<p>OBJECTIVES</p> <ol style="list-style-type: none"> 1) To design tools that allow workers to move plywood from one place to another. 2) To identify the time savings rates obtained when using Modern Plywood Holder instead of conventional methods. 		<p>MODERN PLYWOOD HOLDER</p> 
	<p>Intellectual Property (IP)</p> <p>Industrial Design :</p>  <p>Perbadanan Harta Intelektual Malaysia Intellectual Property Corporation of Malaysia www.mypipo.gov.my</p> <p>Copyright : LY2019006362</p>	<p>INVENTORS:</p> <p>AIMAN FAREEZ BIN ANDI BAKHTIAR AZRUL FAHMI BIN MOHD RAMLI NOOR SHAHIRAH BINTI AHMAD WAN NURANISA SYAFIQA BINTI WAN SHAHARUDDIN</p> <p>BUILDING SERVICES ENGINEERING</p>

	<p>PROBLEM STATEMENT</p> <ol style="list-style-type: none"> 1) Risk of spinal injury. 2) Difficulty lifting plywood. 3) Excessive use of manpower while lifting plywood. <p>SCOPE</p> <ol style="list-style-type: none"> 1) Wood workshop 2) Hardware 3) Warehouse 	<p>MODERN PLYWOOD HOLDER</p> <p>Modern plywood holder is an innovation of existing plywood lifting equipment. This product is specially designed to assist in the process of moving plywood from one place to another. It is made up of structure, wheels and base for ease of movement during plywood transfer.</p>
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NO.4, JALAN SAUJANA INDAH 5
TAMAN SAUJANA INDAH
SEKSYEN U2, 40150 SHAH ALAM

kerjakayu.my
we build with passion

POLITEKNIK SULTAN SALAHUDDIN ABDUL AZIZ SHAH,
PERSIARAN USAHAWAN, SEKSYEN U1,
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SELANGOR.
Yang Berkenaan,

Tuan/Puan.

PENGUJIAN DAN PENTAULIAHAN ALAT MENGANGKAT PAPAN LAPIS (MODERN PLYWOOD HOLDER)

Merujuk kepada alat mengangkat papan lapis yang telah direka oleh Pelajar Politeknik Sultan Salahuddin Abdul Aziz Shah Jurusan Kejuruteraan Perkhidmatan Bangunan adalah berkaitan.

2. Pihak kami mengucapkan ribuan tahniah di atas kejayaan pelajar-pelajar tersebut merekacipta alat mengangkat papan lapis dimana nama bagi alat tersebut adalah *Modern Plywood Holder*. Penggunaan alat ini khususnya digunakan di kilang atau kedai yang berfungsi untuk memudahakan mengangkat papan lapis.
3. Pihak kami bersama pelajar-pelajar tersebut telah menjalankan pengujian dan pentauliahan alat mengangkat papan lapis pada 9/8/19 bertempat di Bengkel Kayu dan *Welding*, Shah Alam Selangor. Pihak kami amat berpuas hati di atas rekacipta ini.
4. Ini kerana, kelebihan alat ini adalah dapat menjimatkan masa yang diambil untuk memindahkan papan lapis dari satu tempat ke tempat yang lain berbanding dengan menggunakan kaedah konvensional yang digunakan dari hasil pengujian yang telah dibuat. Disamping itu, *Modern Plywood Holder* ini juga dapat mengurangkan tenaga kerja untuk melakukan kerja pemindahan papan lapis.
5. Sehubungan itu, pihak kami berharap pelajar-pelajar tersebut terus maju dalam pembelajaran dan alam perkerjaan di masa akan datang.

Sekian, terima kasih.

Yang Benar,

.....
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PADANG JAWA 40000,
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POLITEKNIK SULTAN SALAHUDDIN ABDUL AZIZ SHAH,
PERSIARAN USAHAWAN, SEKSYEN U1,
40150 SHAH ALAM,
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Sekian, terima kasih.

Yang Benar,

TAKAR NIAGA ENTERPRISE
(USA0334569-W)
.....
MUHAJIR BIN JAMALUDDIN