POLITEKNIK MALAYSIA

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FINAL REPORT PROJECT 2

ROLLING MAT MACHINE

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ABSTRACT

Malaysia is a country with the majority of whom are Muslims. Generally, the use of mosques, suraus and schools is very high. Therefore, it is necessary to take responsibility for ensuring the comfort, cleanliness and safety of the Congregation by adding prayer room using the roll mat. During the fasting month, the use of mats is very high because many Muslims come to the mosque to perform tarawih sunnah prayers, lectures and sahur in the morning. The problem faced when using a roll mat is when to re-update the mat after the ceremony or prayer. It is because of the prolongation of the mat and the quantity of the mat itself. When rolling mats using hands, many problems will occur such as bending when rolling, messy rolls, and taking time to complete a roll. Therefore, the invention of our project is to reduce the risk of back pain, speed up work time and increase the golden roll of the mat. The invention of these automated mat roller machines facilitates the work of mosques and schools because they do not need much energy and facilitate their work. Moreover, this machine is also very easy to operate and the price is very affordable. Its usage period is also very long which is for a five to seven-year. The way to use it is by infusing the mat into an iron chopstick and pressing the switch to move the electric motor. After the mat is rolled, the user needs to open the door connected to the mat chopstick to bring the mat roll out of the iron chopstick. School also agreed that the project could help reduce students' time when they wanted to update the mats in the hall upon completion of a ceremony. After researching and taking all the data in this project, we have made several improvements i.e. the type of motor that is suitable for use. We intend to use the fan motor but fail to move the mat roller chain. Therefore, we are looking for higher powerful motors like my1016z motors.

Keyword: Automatic Rolling Mat Machine

ABSTRAK

Malaysia merupakan negara yang majoritinya ialah umat islam. Umumnya, penggunaan masjid, surau serta sekolah adalah sangat tinggi. Oleh itu, pihak tersebut perlu mengambil tanggungjawab untuk memastikan keselesaan, kebersihan dan keselamatan para Jemaah dengan menambahkan ruangan solat menggunakan tikar gulung. Pada bulan puasa, penggunaan tikar adalah sangat tinggi kerana ramai umat islam datang ke masjid untuk menunaikan solat sunat tarawih, ceramah dan sahur pada waktu pagi. Masalah yang dihadapi ketika menggunakan tikar gulung adalah apabila hendak mengemas kembali tikar tersebut selepas majlis atau solat. Hal ini demikian,kerana kepanjangan tikar tersebut dan kuantiti tikar itu sendiri. Apabila menggulung tikar menggunakan tangan, banyak masalah yang akan berlaku seperti membongkok ketika menggulung, gulungan yang tidak kemas, dan mengambil masa untuk menyiapkan satu gulungan. Oleh itu, ciptaan projek kami adalah untuk mengurangkan risiko sakit belakang, mempercepatkan masa kerja dan meningkatkan kekemasan gulungan tikar tersebut. Ciptaan mesin penggulung tikar automatik ini memudahkan kerja pihak masjid dan sekolah kerana mereka tidak memerlukan tenaga yang banyak dan memudahkan kerja mereka. Selain itu, mesin ini juga sangat mudah untuk dikendalikan dan harganya sangat berpatutan. Tempoh pengunaannya juga sangat panjang iaitu selama lima hingga tujuh tahun. Cara penggunaanya adalah dengan menyelitkan tikar ke dalam penyepit besi dan menekan suis untuk menggerakkan motor elektrik. Selepas tikar tersebut siap digulung, pengguna perlu membuka pintu yang bersambung dengan penyepit tikar untuk membawa gulungan tikar keluar daripada penyepit besi. Pihak sekolah juga bersetuju bahawa, projek ini dapat membantu mengurangkan masa pelajar ketika ingin mengemas tikar di dewan setelah selesai sesuatu majlis.Setelah meneliti dan mengambil semua data dalam projek ini, kami telah membuat beberapa penambahbaikan iaitu jenis motor yang sesuai untuk digunakan. Kami bercadang untuk menggunakan motor kipas tetapi gagal untuk menggerakkan rantai penggulung tikar. Oleh itu, kami mencari motor berkuasa yang lebih tinggi seperti motor my1016z.

Kata Kunci: Mesin Penggulung Tikar Automati

CONTENTS

CHAPTER 1

INTRODUCTION

1.1 INTRODUCTION

The first Asymmetric sheet rolling machine's upper roller is hand-adjusted up and down. The machine has a pre-bending function.

Bending function is power driven, and the upper roller can be moved to remove the workpiece.

YSDCNC Electric light plate bending machine, bending machine for manual partial Samsung processing of thin, small diameter tube design, has the function of pre bending, straight edge smaller. This Machine were created by the company Nanjing Shanduan CNC Machine Tool Co., Ltd is one of the Top 3 press brake and shearing machine in China, which specializing in manufacturing and marketing of press brake, shearing machine, press machine, square duct production line LINE5,4,3,2,1;spiral duct machine, locking forming machine; folding machine, plasma cutting machine, power press, ironworker, hydraulic notching machine, beading machine, flange forming machine, shearing machine & press brake, Blade/Mold , etc.

The design of sheet rolling machines have a good example function for our final year project, so we make innovation based on how the machines work and implicit it in our project idea.

1.2 BACKGROUND RESEARCH

Malaysia is a multicultural and multiconfessional country, whose official religion is Islam. As of the 2010 Population and Housing Census, 61.3 percent of the population practices Islam; 19.8 percent Buddhism; 9.2 percent Christianity; 6.3 percent Hinduism; and 3.4 percent traditional Chinese religions. The use of mats in mosques or in schools is very high because the majority of Muslims use mats in mosques to perform worship, as on Friday where the use of mats increased dramatically as it is the day for Muslims to perform prayers on Friday. In addition to the use of mats during ceremonies, tahlil, suhoor where on fasting and many other activities using mats. In addition, the school also using mats as a way to avoid student clothes dirty as the place where the student was sitting on the walking path. In schools, a lot of mats are used because of the quantity of students and activities at school is more than in the mosque.

1.3 PROBLEM STATEMENTS

As we know, the process of rolling mats takes time and energy, especially in the waist, so this work is often done by young people because the elderly is unable to endure the pain in waist due to age factors, and women also feel a bit burden when doing this work. The mattress roll is also a little messy because the mats are not as heavy as the carpet. The mass of mat is lighter than carpet and this makes the job more complicated. Therefore, the main purpose of the creation of this project is to reduce labour and save time, speed up the work process and have a good and organized mattress roll.

1.4 RESEARCH OF OBJECTIVES

The objectives to this research are:

i. To ease burden of person during rolling a mats.
ii. Minimize risk of injuries in waist when rolling mats.
iii. Reduce time and speed up rolling process to complete one roll of mat.

1.5 RESEARCH QUESTIONS

This study will answer the following research questions:

i. Does using our project really helps reduce time when rolling one complete mat compared to manually roll mat using hand and energy?
ii. Does our specific project design help to lowering the risk injuries compared to manual method?

1.6 SCOPE OF THE RESEARCH

The scopes and limits to this research are:

i. The research is held at the mosques or school that used a lot of mats when holding events.

1.7 SIGNIFICANCE OF THE RESEARCH

This is important because our purpose is to help the mosque or school save their time while cleaning their area when the ceremony is over. Apart from time, energy is also not used much and can be used to do other work.

1.8 SUMMARY

The issue for us to create this project is to help mosque worker or student from school because sometimes mosque or school will have an event that take about a week, so it takes a lot of energy and times to make the program a success. Because of that, we decided to create our project that rolling mat machine to cut from using a lot of time and energy. Our product also to make sure the consumer health is guaranteed. Other than that, in order to create a safer environment, we decide to use an eco-friendly environment which we will use battery instead of oil.

CHAPTER 2

LITERATURE REVIEW

2.1 INTRODUCTION

In this chapter, will be shown a few materials used in making rolling mat machine. Hence, all this material will be compared to our own product which has its own specialties and benefits. First mats have been produced in 19th century. The beginning of this generate, as generating mats for many several years, is at times connected with weaving baskets. The earliest ones ended up made by interlacing blades of grass, depart of reed positioned at a ninety-degree angle. As mat is a basic identify for a flat content that lies on the flooring and other flat surface, it has a broad array of sorts that different in size, shades, models, function and component that are created of. Typically, it is a form of ground covering but it also has a different purpose and different names, often for household, school and mosques utilization. The mats made from Cyperus pangorei (Korai grass in Tamil) are called "Korai paai" in Tamil and can be found widely in the households of Tamil Nadu, usually in the size 6 feet by 3 feet.

In the United Kingdom, under the name of "coir" matting, a large amount of a coarse kind of carpet is made from coconut fibre; and the same material, as well as strips of cane, manila hemp, various grasses and rushes, is largely employed in various forms for making doormats. Large quantities of the coconut fibre are woven in heavy looms, then cut up into various sizes, and finally bound round the edges by a kind of rope made from the same material. The mats may be of one colour only, or they may be made of different colour and in different designs. Sometimes the names of institutions are introduced into the mats. Due to the silky nature and tensile strength, jute mats or matting have started being used as floor covering or doormats, runners and in different forms. Jute floor coverings consist of woven and tufted and piled carpets. Jute Mats and matting starting from 1 m width to 6 m width and of continuous length are easily being woven in Southern parts of India, in solid and fancy shades, and in different weaves such as boucle, Panama and herringbone. Jute mats and rugs are made on both power looms and hand looms in large volumes in Kerala, India. Indian jute matting / rugs is being widely used in USA and European countries, due to its soft nature. Jute can be easily bleached, coloured or printed, similar to textile fibres, with eco-friendly

dyes & chemicals. Hand-knotted Jute carpets & matting are also being made from Kerala, India.

Malaysia is a country that is predominantly populated by Muslims. In this case, they often use mats for use while in mosques during worship. Therefore, they think that the process of rolling out these mats takes a long time, especially to get the dozens of mats used in the mosque. In this situation, sometimes the mattress looks very neat and tidy. This is because, not all of the people have the time, diligence and power to do the work of rolling a mat. Especially for older people. Turning to the situation, Muslims alike have not forgotten the students who use the mats in school prayer, but still use the old and slow way of rolling the mat.

In this growing age, we have been inspired to simplify the work of mats by creating mat roller machine. But the creation of these mattresses has come to fruition when looking at mosque or surau users who find it difficult to roll mats. In addition, we also want to reduce the rate of damage to the mats that are not rolled up neatly and are left untidy.

2.2 Research

2.2.1 Research of Hollow Tube

2.2.1.1 HSS Hollow Tube

A hollow structural section (HSS) is a type of metal profile with a hollow cross section. The term is used predominantly in the United States, or other countries which follow US construction or engineering terminology's HSS members can be circular, square, or rectangular sections, although other shapes such as elliptical are also available. HSS is only composed of structural steel per code.

HSS is sometimes mistakenly referenced as hollow structural steel. Circular HSS are sometimes mistakenly called steel pipe, although true steel pipe is actually dimension and classed differently from HSS. (HSS dimensions are based on exterior dimensions of the profile; pipes are also manufactured to an exterior tolerance, albeit to a different standard.) The corners of HSS are heavily rounded, having a radius which is approximately twice the wall thickness. The wall thickness is uniform around the section.

In the UK, or other countries which follow British construction or engineering terminology, the term HSS is not used. Rather, the three basic shapes are referenced as CHS, SHS, and RHS, being circular, square, and rectangular hollow sections. Typically, these designations will also relate to metric sizes, thus the dimensions and tolerances differ slightly from HSS.

Hence, square and circular HSS have very efficient shapes for this multiple-axis loading as they have uniform geometry along two or more cross-sectional axes, and thus uniform strength characteristics. This makes them good choices for columns. They also have excellent resistance to torsion.

HSS can also be used as beams, although wide flange or I-beam shapes are in many cases a more efficient structural shape for this application. However, the HSS has superior resistance to lateral torsional buckling. In the recent past, HSS was commonly available in mild steel, such as A500 grade B. Today, HSS is commonly available in mild steel, A500 grade C. Other steel grades available for HSS are A847 (weathering steel), A1065 (large sections up to 50 inch sq made with SAW process), and recently approved A1085 (higher strength, tighter tolerances than A500).

HSS is often filled with concrete to improve fire rating, as well as robustness. When this is done, the product is referred to as a Lally column after its inventor John Lally of Waltham, Massachusetts. (The pronunciation is often corrupted to lolly column.) For example, barriers around parking areas (bollards) made of HSS are often filled, to at least bumper height, with concrete. This is an inexpensive (when replacement costs are factored in) way of adding compressive strength to the bollard, which can help prevent unsightly local denting, though it does not generally significantly increase the overall structural properties of the bollard.

Figure 2.2.1.1

2.2.2 Research of Metal Sheet

2.2.2.1 Stainless Metal Sheet

Hand-hammered metal sheets have been used since ancient times for architectural purposes. Water-powered rolling mills replaced the manual process in the late 17th century. The process of flattening metal sheets required large rotating iron cylinders which pressed metal pieces into sheets. The metals suited for this were lead, copper, zinc, iron and later steel. Tin was often used to coat iron and steel sheets to prevent it from rusting. This tin-coated sheet metal was called "tinplate." Sheet metals appeared in the United States in the 1870s, being used for shingle roofing, stamped ornamental ceilings, and exterior façades. Sheet metal ceilings were only popularly known as "tin ceilings" later as manufacturers of the period did not use the term. The popularity of both shingles and ceilings encouraged widespread production. With further advances of steel sheet metal production in the 1890s, the promise of being cheap, durable, easy to install, lightweight and fireproof gave the middle-class a significant appetite for sheet metal products. It was not until the 1930s and WWII that metals became scarce and the sheet metal industry began to collapse. However, some American companies, such as the W.F. Norman Corporation, were able to stay in business by making other products until Historic preservation projects aided the revival of ornamental sheet metal.

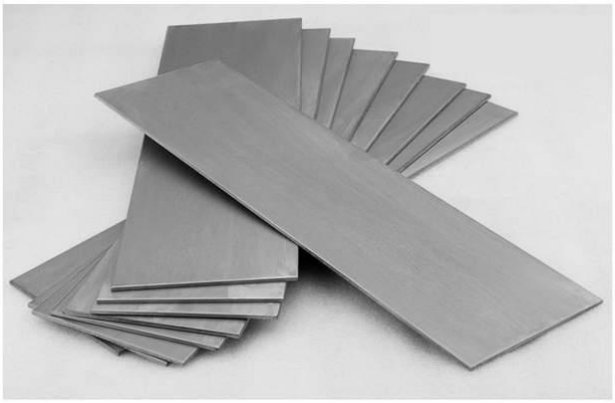
Sheet metal is metal formed by an industrial process into thin, flat pieces. Sheet metal is one of the fundamental forms used in metalworking, and it can be cut and bent into a variety of shapes. Countless everyday objects are fabricated from sheet metal. Thicknesses can vary significantly; extremely thin sheets are considered foil or leaf, and pieces thicker than 6 mm (0.25 in) are considered plate steel or "structural steel". Sheet metal is available in flat pieces or coiled strips. The coils are formed by running a continuous sheet of metal through a roll slitter.

In most of the world, sheet metal thickness is consistently specified in millimeters. In the US, the thickness of sheet metal is commonly specified by a traditional, non-linear measure known as its gauge. The larger the gauge number, the thinner the metal. Commonly used steel sheet metal ranges from 30 gauge to about 7 gauge. Gauge differs between ferrous (iron-based) metals and nonferrous metals such as aluminum or copper. Copper thickness, for example, is measured in ounces, representing the weight of copper contained in an area of one square foot. Parts manufactured from sheet metal must maintain a uniform thickness for

ideal results. There are many different metals that can be made into sheet metal, such as aluminum, brass, copper, steel, tin, nickel, and titanium. For decorative uses, some important sheet metals include silver, gold, and platinum (platinum sheet metal is also utilized as a catalyst).

Sheet metal is used in automobile and truck (lorry) bodies, airplane fuselages and wings, medical tables, roofs for buildings (architecture), and many other applications. Sheet metal of iron and other materials with high magnetic permeability, also known as laminated steel cores, has applications in transformers and electric machines. Historically, an important use of sheet metal was in plate armor worn by cavalry, and sheet metal continues to have many decorative uses, including in horse tack. Sheet metal workers are also known as "tin bashers" (or "tin knockers"), a name derived from the hammering of panel seams when installing tin roofs.

Figure 2.2.2.1



2.2.3 Research of Wheel

2.2.3.1 Wheel

In its primitive form, a wheel is a circular block of a hard and durable material at whose center has been bored a circular hole through which is placed an axle bearing about which the wheel rotates when a moment is applied by gravity or torque to the wheel about its axis, thereby making together one of the six simple machines. When placed vertically under a load-bearing platform or case, the wheel turning on the horizontal axle makes it possible to transport heavy loads; when placed horizontally, the wheel turning on its vertical axle makes it possible to control the spinning motion used to shape materials when mounted on a column connected to a rudder or a chassis mounted on other wheels, one can control the direction of a vessel or vehicle when connected to a crank or engine, a wheel can store, release, or transmit energy.

The invention of the wheel has been credited to the Elamites because their sculptures are the earliest to portray it. The invention of the solid wooden disk wheel falls into the late Neolithic, and may be seen in conjunction with other technological advances that gave rise to the early Bronze Age. This implies the passage of several wheel-less millennia even after the invention of agriculture and of pottery, during the Aceramic Neolithic.

Figure 2.2.3.1

2.2.4 Research of Gear

2.2.4.1 Gear

Early examples of gears date from the 4th century BC in China (Zhan Guo times – Late East Zhou dynasty), which have been preserved at the Luoyang Museum of Henan Province, China. The earliest preserved gears in Europe were found in the Antikythera mechanism, an example of a very early and intricate geared device, designed to calculate astronomical positions. Its time of construction is now estimated between 150 and 100 BC. Gears appear in works connected to Hero of Alexandria, in Roman Egypt circa AD 50, but can be traced back to the mechanics of the Alexandrian school in 3rd-century BC Ptolemaic Egypt, and were greatly developed by the Greek polymath Archimedes (287–212 BC).

A gear or cogwheel is a rotating machine part having cut teeth or, in the case of a cogwheel, inserted teeth (called cogs), which mesh with another toothed part to transmit torque. Geared devices can change the speed, torque, and direction of a power source. Gears almost always produce a change in torque, creating a mechanical advantage, through their gear ratio, and thus may be considered a simple machine. The teeth on the two meshing gears all have the same shape. Two or more meshing gears, working in a sequence, are called a gear train or a transmission. A gear can mesh with a linear toothed part, called a rack, producing translation instead of rotation.

The gears in a transmission are analogous to the wheels in a crossed, belt pulley system. An advantage of gears is that the teeth of a gear prevent slippage. When two gears mesh, if one gear is bigger than the other, a mechanical advantage is produced, with the rotational speeds, and the torques, of the two gears differing in proportion to their diameters.

In transmissions with multiple gear ratios—such as bicycles, motorcycles, and cars—the term "gear" as in "first gear" refers to a gear ratio rather than an actual physical gear. The term describes similar devices, even when the gear ratio is continuous rather than discrete, or when the device does not actually contain gears, as in a continuously variable transmission.

Figure 2.2.4.1

2.2.5 Research of Bearing

2.2.5.1 Bearing

The invention of the rolling bearing, in the form of wooden rollers supporting, or bearing, an object being moved is of great antiquity, and may predate the invention of the wheel.

Though it is often claimed that the Egyptians used roller bearings in the form of tree trunks under sleds, this is modern speculation. They are depicted in their own drawings in the tomb moving massive stone blocks on sledges with liquid-lubricated runners which would constitute a plain bearing. There are also Egyptian drawings of bearings used with hand drills.

The earliest recovered example of a rolling element bearing is a wooden ball bearing supporting a rotating table from the remains of the Roman Nemi ships in Lake Nemi, Italy. The wrecks were dated to 40 BC. Leonardo da Vinci incorporated drawings of ball bearings in his design for a helicopter around the year 1500. This is the first recorded use of bearings in an aerospace design. However, Agostino Ramelli is the first to have published sketches of roller and thrust bearings. An issue with ball and roller bearings is that the balls or rollers rub against each other causing additional friction which can be reduced by enclosing the balls or rollers within a cage. The captured, or caged, ball bearing was originally described by Galileo in the 17th century.

The first practical caged-roller bearing was invented in the mid-1740s by horologist John Harrison for his H3 marine timekeeper. This uses the bearing for a very limited oscillating motion but Harrison also used a similar bearing in a truly rotary application in a contemporaneous regulator clock.

The term "bearing" is derived from the verb "to bear”; a bearing being a machine element that allows one part to bear another. The simplest bearings are bearing surfaces, cut or formed into a part, with varying degrees of control over the form, size, roughness and location of the surface. Other bearings are separate devices installed into a machine or machine part. The most sophisticated bearings for the most demanding applications are very precise devices; their manufacture requires some of the highest standards of current technology.

A bearing is a machine element that constrains relative motion to only the desired motion, and reduces friction between moving parts. The design of the bearing may, for

example, provide for free linear movement of the moving part or for free rotation around a fixed axis; or, it may prevent a motion by controlling the vectors of normal forces that bear on the moving parts. Most bearings facilitate the desired motion by minimizing friction. Bearings are classified broadly according to the type of operation, the motions allowed, or to the directions of the loads (forces) applied to the parts.

Rotary bearings hold rotating components such as shafts or axles within mechanical systems, and transfer axial and radial loads from the source of the load to the structure supporting it. The simplest form of bearing, the plain bearing, consists of a shaft rotating in a hole. Lubrication is used to reduce friction. In the ball bearing and roller bearing, to reduce sliding friction, rolling elements such as rollers or balls with a circular cross-section are located between the races or journals of the bearing assembly. A wide variety of bearing designs exists to allow the demands of the application to be correctly met for maximum efficiency, reliability, durability and performance.

Figure 2.2.5.1

2.2.6 Research of Motor Chain

2.2.6.1 Motor Chain

The oldest known application of a chain drive appears in the Polybolos, a repeating crossbow described by the Greek engineer Philon of Byzantium (3rd century BC). Two flat-linked chains were connected to a windlass, which by winding back and forth would automatically fire the machine's arrows until its magazine was empty.Although the device did not transmit power continuously since the chains "did not transmit power from shaft to shaft, and hence they were not in the direct line of ancestry of the chain-drive proper", the Greek design marks the beginning of the history of the chain drive since "no earlier instance of such a cam is known, and none as complex is known until the 16th century." It is here that the flat-link chain, often attributed to Leonardo da Vinci, and actually made its first appearance."

The first continuous and endless power-transmitting chain drive was depicted in the written horological treatise of the Song Dynasty by the medieval Chinese polymath mathematician and astronomer Su Song (1020-1101 AD), who used it to operate the armillary sphere of his astronomical clock tower as well as the clock jack figurines presenting the time of day by mechanically banging gongs and drums.The chain drive itself converted rotary to recliner motion and was given power via the hydraulic works of Su's water clock tank and waterwheel, the latter which acted as a large gear.

Chain drive is a way of transmitting mechanical power from one place to another. It is often used to convey power to the wheels of a vehicle, particularly bicycles and motorcycles. It is also used in a wide variety of machines besides vehicles.

Most often, the power is conveyed by a roller chain, known as the drive chain or transmission chain, passing over a sprocket gear, with the teeth of the gear meshing with the holes in the links of the chain. The gear is turned, and this pulls the chain putting mechanical force into the system. Another type of drive chain is the Morse chain, invented by the Morse Chain Company of Ithaca, New York, United States. This has teeth inverted.

Sometimes the power is output by simply rotating the chain, which can be used to lift or drag objects. In other situations, a second gear is placed and the power is recovered by attaching shafts or hubs to this gear. Though drive chains are often simple oval loops, they can also go around corners by placing more than two gears along the chain; gears that do

not put power into the system or transmit it out are generally known as idler-wheels. By varying the diameter of the input and output gears with respect to each other, the gear ratio can be altered. For example, when the bicycle pedals' gear rotate once, it causes the gear that drives the wheels to rotate more than one revolution.

Figure 2.2.6.1

2.2.7 Research of DC Motor

2.2.7.1 DC Motor

DC motors convert electrical energy into mechanical energy, compared with AC motors, DC motors have many advantages good speed performance, high starting torque and overload, etc., and it is widely used in machinery industry. MCU control DC motor is a typical application in mechanical and electrical control, just between the two ends of the DC motor control coupled with a voltage difference between the voltage it will rotate, changing the applied voltage across can change the direction of rotation. This paper designs DC motor control system based on microcontroller is presented. We use STC89C52 micro controller as kernel controller, TA7267BP as driver chip, and four keys to control the DC motor reversions, break corresponding state indicators. Hardware circuit and achievable method of software are also presented choice in controlling micro DC motor stop, and light the system is a better.

DC motor has been widely used in various fields among which single-phase, two-phase, three equally endless variety of operating mode, and each class of brushless DC motor drive system is divided into multiple, rather half-bridge drivers and full bridge drivers become the most widely used drive. Full-bridge driving mode can be divided into a variety of the most commonly used is the star and angled connector, select the drive mode will directly affect the performance and cost of the motor, so select the appropriate drive way is a top priority. DC simple internal structure, conducive to the maintenance of the motor, and the complete elimination of the common motor by a mechanical brush and commutator caused by failure, but also greatly increases the life of the motor. Work efficiency has been significantly improved due to the use of permanent magnet brushless DC motor generates a constant, continuous magnetic field, so it is currently the most efficient motor in an electrical machine, in most conditions its permanent magnet having a relatively magnetic coefficient

Figure 2.2.7.1

2.2.8 Research of Battery

2.2.8.1 Battery

Developing green energy solutions has become crucial to society. However, to develop a clean and renewable energy system, significant developments must be made, not only in energy conversion technologies (such as solar panels and wind turbines) but also regarding the feasibility and capabilities of stationary electrical energy storage (EES) systems. Many types of EES systems have been considered such as pumped hydroelectric storage (PHS), compressed air energy storage (CAES), flywheels, and electrochemical storage. Among them, electrochemical storage such as battery has the advantage of being more efficient compared to other candidates, because it is more suitable in terms of the scalability, efficiency, lifetime, discharge time, and weight and/or mobility of the system. Currently, rechargeable lithium ion batteries (LIBs) are the most successful portable electricity storage devices, but their use is limited to small electronic equipment. Using LIBs to store large amounts of electrical energy in stationary applications is limited, not only by performance but also by cost. Thus, a viable battery technology that can store large amounts of electrical energy in stationary applications is needed. In this review, well-developed and recent progress on the chemistry and design of batteries, as well as their effects on the electrochemical performance, is summarized and compared. In addition, the challenges that are yet to be solved and the possibilities for further improvements are explored

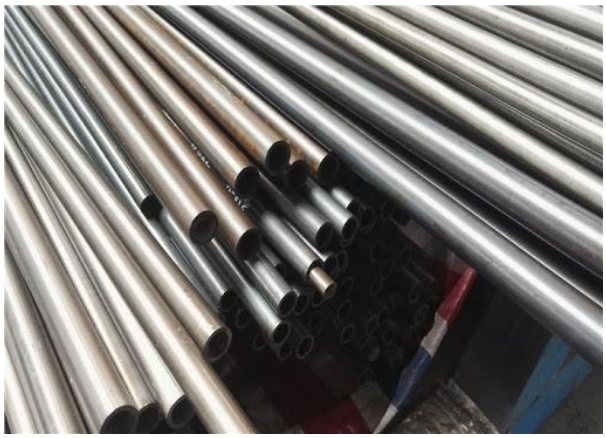
Figure 2.2.8.1

2.3 CONCEPT / THEORY

Mattress machine is an initiative to make it easier for worshipers who worship at mosques, suraus and schools to roll mats. At first this idea was just created as a manual rolling tool. But with this ever-expanding era, we are innovating our idea again by making it a mattress machine. Where, the device does not deplete the human labor force but does 100% of the machine's energy. With this in mind, we expect the work of rolling mats in mosques and school mosques to be well organized and to provide maximum level of cleanliness to the mosque. Moreover, the use of this machine is also very easy and does not require high expertise.

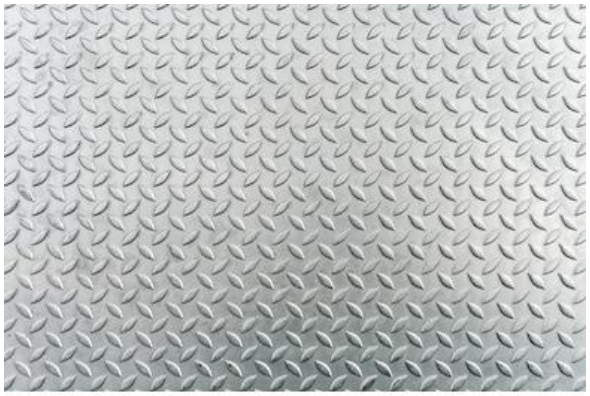
2.4 MATERIAL SELECTION

2.4.1 Hollow Square 10mmx10mm



2.4.2 Hollow Tube ½ Inch

2.4.3 Caster Wheel



2.4.4 Metal Sheet

2.4.5 Bearing

2.4.6 Sprocket 15

2.4.7 Motor Chain

2.4.8 Battery

2.4.9 DC Motor

2.5 SUMMARY

As to conclude this chapter, literature review is important to showcase all the studies of materials and concept to enhance the knowledge on this project. Every thesis and research of the material are related our project. It is also help us to make our project successful.

After a lot of materials and concept were discussed and researches were done, the materials that are the most compatible for our project is Hollow Square, Hollow Tube, Caster Wheel, Metal Sheet, Bearing, Sprocket, Motor Chain, Battery, DC Motor. This is because of its low cost benefits and great for beginner's process.

CHAPTER 3

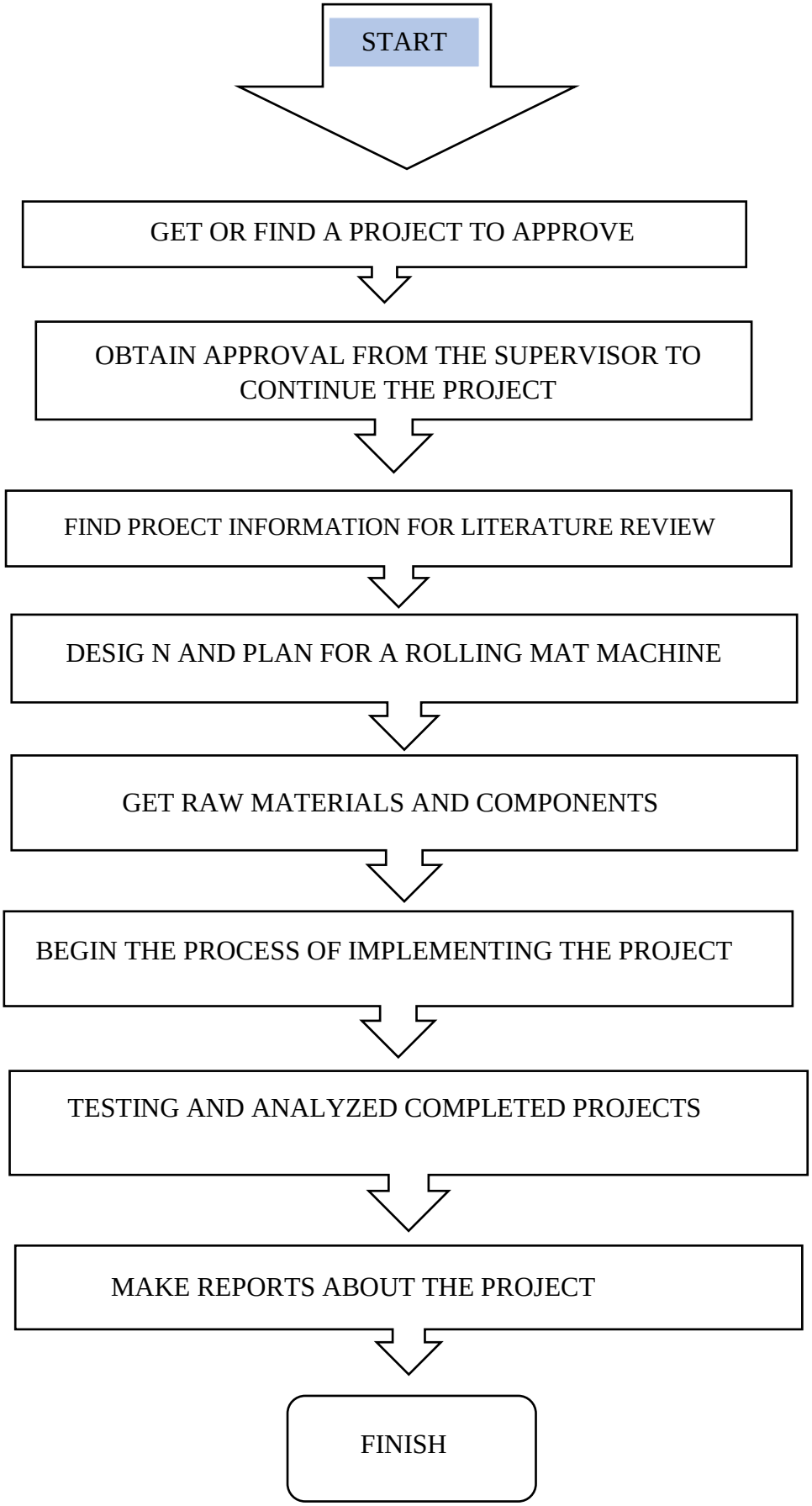
RESEARCH METHODOLOGY

3.1 INTRODUCTION

In this chapter, we will be shown the result and method that we research from the survey. This chapter will mention every component involving on conducting the research from the Polytechnic Sultan Abdul Aziz Shah (PSA)'s students and the majority of Muslims that to perform worships and sampling techniques used for the interview. Finally, this chapter provides a detail explanation of the selected mode of analysis used and data collection method from the face-to-face interview and by Google Form method.

3.2 FLOW CHART

FLOW CHART DIAGRAM



3.2.1 Research Design

The research is conducted using qualitative, casual, face-to-face interview and by Google Form method.

3.2.2 Data Collection Method

Quantitative methods were selected for data collection using questionnaires and Google Form. The questionnaire was distributed to respondents face to face while the Google Form and distributed to the Polytechnic Sultan Salahuddin Abdul Aziz Shah (PSA)'s students. The data collection period took place for 2 months from 10 Feb 2020 to 10 April 2020. The data obtained are used to improve the design and function. Next, we also have face-to-face interview to the Muslims because the majority of Muslim use of mats in mosques to perform worship or in schools are very high.

3.2.3 Research Instruments

The research instrument is based on the scales. These include supplier opinions, information sharing and people opinion from the Polytechnic Sultan Salahuddin Abdul Aziz Shah (PSA)'s students and the Muslims, etc. The questionnaire used consisted of a 5-point type format such as (1 = strongly disagree to 5= strongly agree) divided into 3 sections. The first part examines the personal information that was gender, age and positions. In the survey, we conducted that on a total of 50 persons that was 35 males and 15 females. Then, there were the majority of 18-25 ages' response the research. The positions were including the students and the Muslims and prayers. The second part are about design acceptance of our product. From the result, they are strongly agreeing that our product must lighter so it can suitable used for all of us even the ages and genders. Next, they are also strongly agreeing that our product can help lowering the risk injuries compared the normally method. Lastly, they just agree that the cost is higher in the range of RM 150 – RM300. The third part are about overall opinions, design improvement suggestion and etc. They have given some opinions just like the surface could not use the material of glass because it is heavy and heat absorbent. It also is less impact, rigid and a brittle material. When it is subjected to stress, it breaks without significant strain. Broken pieces of glass may be sharp and chances of injury are very high. They also give some opinions that we can innovate it to become automatic, that need to use the apparatus is motor, and so it can save the time and energy.

3.2.4 Sampling Techniques

For the research, we use the clustered sampling. A group of the population are used as the sampling unit, rather than individuals. The population is divided into subgroups, known as clusters, which are randomly selected to be included in the research. We will primarily use a single stage of clustered sampling. In single stage cluster sampling, we are included in the research.

3.2.5 Data Analysis Method

The data that have been collected will be process and analysis so that we can get the ideas on the product. The data collected will be use to improve our product and make a little change. So, that we collect the students' opinions that we can use the motor to make our product become automatic and can save the energy, manpower and the time. Time is very important to all of us, for an example, if we use the machine with manual, maybe we need to take 5 minutes to collect all the mates, but if we innovate it to the automatic maybe just we can collect all the mates in 1 minute. About the design, we also can improve it to become better, that our product not so coarse. Then, we can also innovate our machine can fold it, so that we can saving the places when we put into the store room.

3.3 PROJECT DESIGN

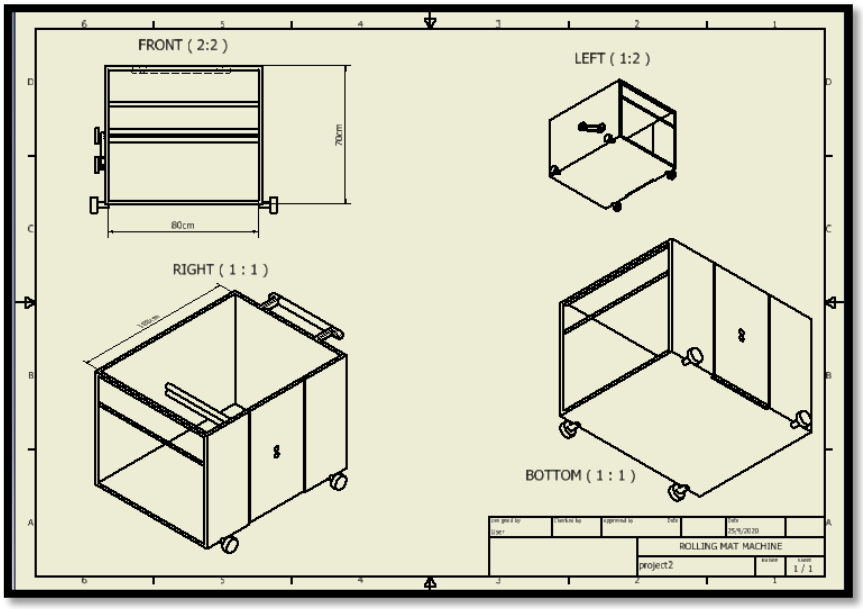


Figure 3.3.1 (a) Product Design

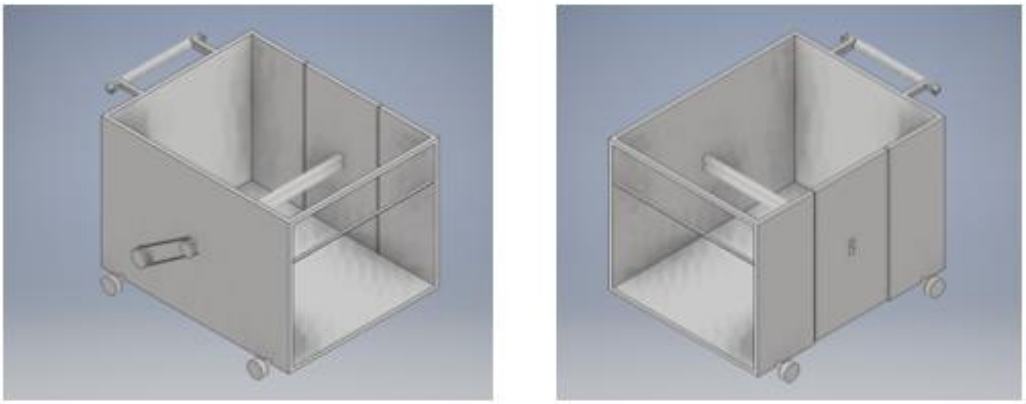
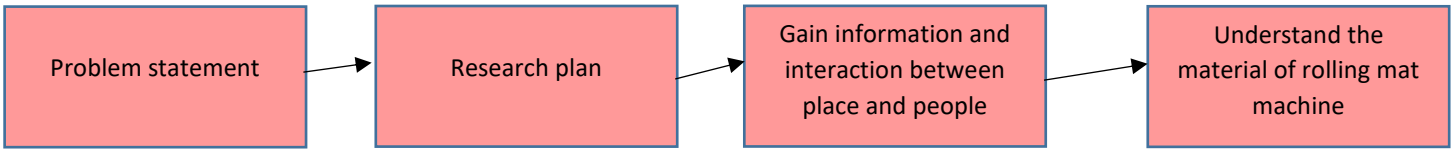


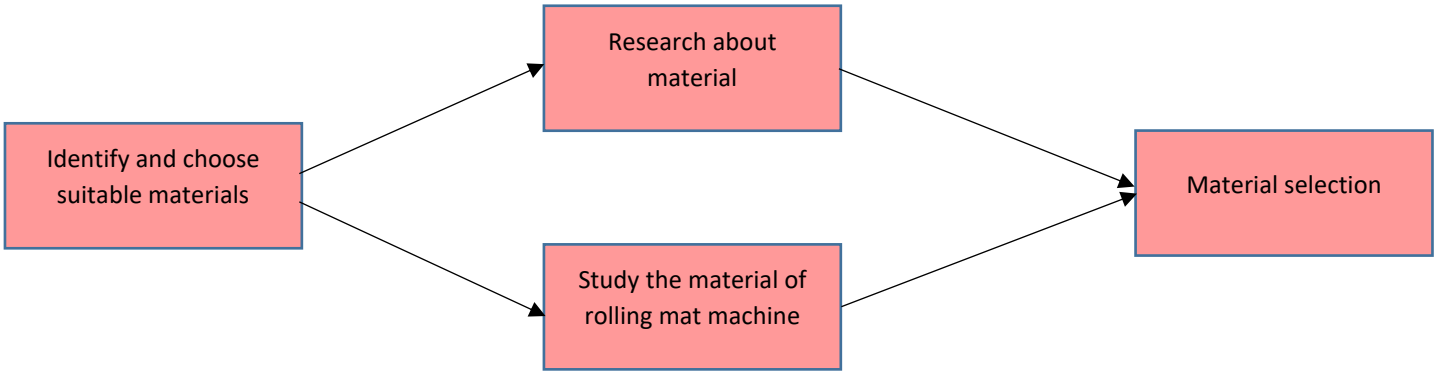
Figure 3.3. (b) Finish product development

3.4 METHODOLOGY PHASE

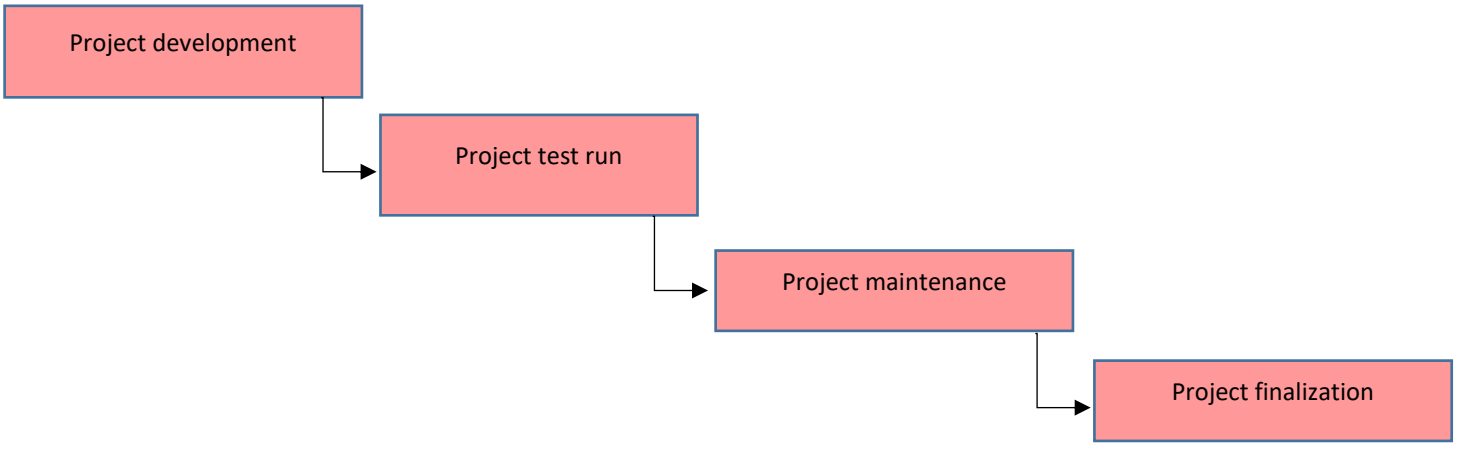
Phase 1: data analysis



Phase 2: method and material



Phase 3: preliminary study



3.5 BUDGET CALCULATION

NO	MATERIAL	PRICE
1	Hollow Square 10mmx10mm	RM 60
2	Hollow Tube ½ Inch	RM 40
3	Caster Wheel	RM 34
4	Metal Sheet	RM 80
5	Bearing	RM 10
6	Sprocket 15	RM 10
7	Motor Chain	RM 10
8	DC Motor	RM 150
9	Door lock	RM13
10	Bolt nut	RM6
11	Battery	RM40
	TOTAL	RM453

3.6 PROJECT ACTIVITY

3.6.1 Project Activities December 2019

project Activity	weeks														
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
Group Selection															
Project Brainstorming															
Title Selection															
Literature Review															
Design															
Methodology															
Material Selection															
Gantt Chart															
Presentation															

KEY

Planning

Actual

3.6.2 Project Activities June 2020

project Activity	weeks														
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
Material research															
Materials Purchase															
Fabrication															
Test Run															
Analysis Data															
Report Writing															
Video and Slide making															
PITEX preparations															
PITEX presentation															

KEY

Planning

Actual

3.7 SUMMARY

In the conclusion of this chapter, the research methodology is the most important to showcase that peoples' opinions and suggestions. We used to collect and analyse the data required to address the research questions and to test the hypothesized relationships developed in this study. The chapter begins with a discussion of the research design, followed by the data collection method that we collect the data from the 50 persons. The chapter then continues with the research instruments that we use google form to collect the data, the opinions and some design improvement. Next, the discussion centres on the sampling techniques, focusing on the mail survey. Finally, the choice methods of data analysis are discussed that we get innovate our machine into fold and try to add the motor to make our product better.

CHAPTER 4

FINDING AND ANALYSIS

4.1 INTRODUCTION

This chapter combine data and analysis of the rolling mat machine and its materials calculations. This data and analysis are very important for this project to achieve the objectives and scope of the project. This data indicates the successful results of the materials testing. After getting all of this data, we analyze every single possible to make it perfect.

4.2 ADVANTAGE OF ROLLING MAT MACHINE

i. Simplify the work of rolling mat.

As we know mat a wide and long object. In this case, after using the met it should be folded neat and tidy. It is very difficult to do especially for the older people. Thus, this machine can simplify the work. All we have to do is insert the mat into the roller room and then press on to start the mat. It only takes about less than one minute to complete one roll of mat.

ii. Avoid hip pain.

The process of rolling mat is usually done by the posture subject. People who often do this work suffer from hip pain. For general knowledge, posture is subjected to causing the person to be unable to bend, pain when standing upright, swelling in the back and swelling of the spine. This risk can be avoided if you use a mat machine.

iii. Saving time

This mattress roller is innovated with a rolling speed level that can be complete in 30-45 seconds. It is because, according to the experience of humans who have rolled mats, they take about 1-2 minutes to complete one roll of mat. Its take time by using manual method.

iv. Eco-friendly

The use of this mat machine does not affect the environment. It is because, this machine does not release gas or toxic that can harm the environment such as animals and humans. In addition, this machine does not cause noise such as noise disturbance. This machine performs its task in a very efficient and silent manner.

4.2.1 Disadvantages of Rolling Mat Machine

i. Heavy

The weight of this machine is 9kg. People around age 17 above can carry this machine and below this age maybe cannot. It can harm people if it's not carry carefully.

ii. No control speed.

The speed cannot be increase or decrease. It speed are maintain and it controlled by off / on switch.

iii. Cannot carry 8kg above of mat.

If we put 8kg and above of mat on this machine, it will break because it is too heavy.

4.3 TEST RUN

On the other hand, the first attempt while using an 80w powered motor, the spin movement was very slow. The motor takes 3 minutes to complete a mat roll. Second attempt, we tried to use a 240w powerful motor. The spin movement of the motor takes 1minute 28 seconds. But the time result still does not satisfy our needs. For the last experiment, we used a powerful 750w motor. The last results are very satisfying for our will. It is only takes 1 minute to complete one roll of mats. Moreover, this product is very durable and will not rust. It can move smoothly. .

Nevertheless, this product can carry at least 3kg of roll mat. Finally, it can be concluded that the stated objectives were achieved and implemented effectively.

4.4 ANALYSIS

The project rolling mat machine was designed to save time, energy and speed up the work process.This project aiming to reduce the risk of back pain and have a good and organized mattress roll. At the beginning, we planned to use hand-adjusted roller mat, but it took a very long time to wind up the mat. We changed our plans using my1016z motor. This motor can make our product become automatic and can save the energy, manpower and the time. Time is very important to all of us, for an example, if we use the machine with manual, maybe we need to take 5 minutes to collect all the mates, but if we innovate it to the automatic maybe just we can collect all the mates in 1 minute. This motor gives a very high speed. This allows the winding of mats to be done very fast. Project Design was successfully proposed and fabricated according to designed material and fabrication method.

4.5 SUMMARY

In conclusion of this chapter, knowing the good and bad of our project is important to have a good result at the end of project. Not only that, from here we can make a lot of improvement to our project also to prevent from any mistake occur in future.

CHAPTER 5

DISCUSSION AND CONCLUSION

5.1 INTRODUCTION

Based on the information gathered and the research carried out this chapter will discuss the conclusion and discussion for improving this project. This improvement proposal was made after all the disadvantages and potential of this rolling mat machine were identified.

5.2 DISCUSSION

For solution proposals, at first we wanted to use pieces of iron to cover the walls and floor but the cost is too high so we decided to use hollow iron and made it likes a fence style to cover the walls and fences, turns out it makes our project look more better. Other than that, we also used round aluminum hollow tube to support mat load, we use MIG welding to make sure our project last longer and didn't break. We also used car battery to make sure power supply can use for long term.

5.3 CONCLUSION

Through this project, it really helpful to speed up time as well as work to roll mats. The issue for us to create this project is to help mosque worker or student from school because sometimes mosque or school will have an event that take about a week, so it takes a lot of energy and times to make the program a success. Because of that, we decided to create our project that rolling mat machine to cut from using a lot of time and energy. Our product also to make sure the consumer health is guaranteed. Other than that, in order to create a safer environment, we decide to use an eco-friendly environment which we will use battery instead of oil.

REFFERENCES

[1] *Industrial Matting – Notrax® Ergonomic Anti-Fatigue & Safety Matting – Notrax®* ***Mats for*** *Professional Use*

[2] https://en.wikipedia.org/wiki/Hollow_structural_section

[3] Central Steel & Wire Company Catalog". *Central Steel & Wire Company Catalog* (2006– 2008 ed.): 151.

[4] https://en.wikipedia.org/wiki/Sheet_metal

[5] *"wheel". Online Etymology Dictionary. Archived from the original on 3 July 2017. Retrieved* 28 March *2007.*

[6] "Definition of GEAR". www.merriam-webster.com. Retrieved 20 September *2018.*

[7] https://en.wikipedia.org/wiki/Gear

[8] https://en.wikipedia.org/wiki/Bearing_(mechanical)

[9] *Merriam-Webster, "headwords "bearing" and "bear"", Merriam-Webster's Collegiate Dictionary, online subscription version*

[10] https://en.wikipedia.org/wiki/Chain_drive

[11] Herman, Stephen. Industrial Motor Control. 6th ed. Delmar, Cengage Learning, 2010. Page 251.

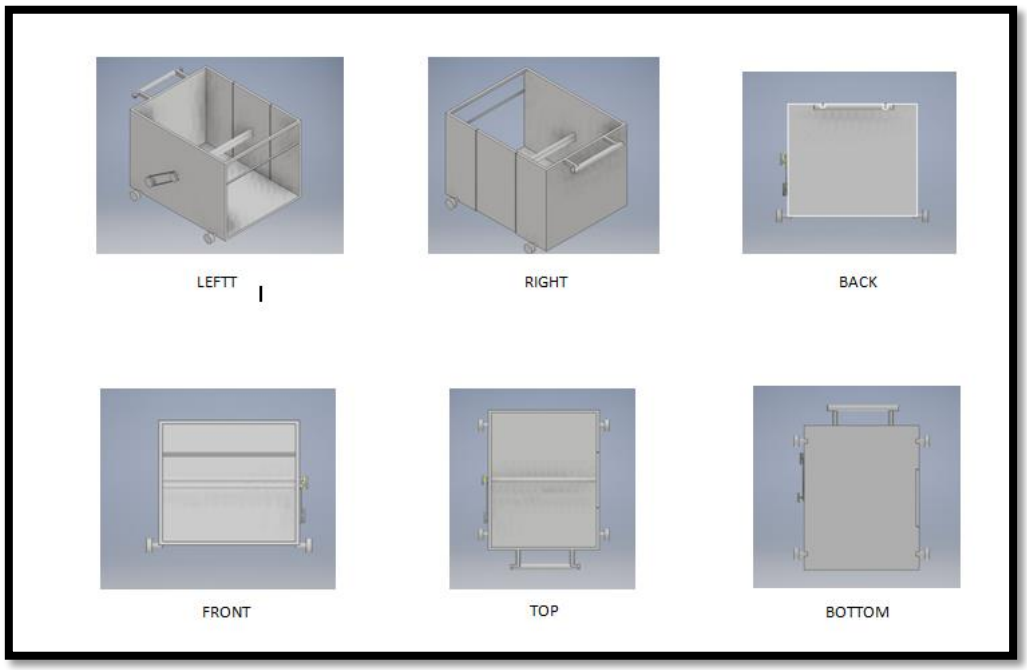
[12]^ Ohio Electric Motors. DC Series Motors: High Starting Torque but No Load Operation Ill-Advised. Ohio Electric Motors, 2011. Archived October 31, 2011, at the Wayback Machine

[13] battery hazards". *YouTube*. Retrieved 20 September 2018.

[14] https://en.wikipedia.org/wiki/Webster%27s_Dictionary

[15] https://www.healthline.com/health/back-pain

APPENDIXES



Project drawing

Actual project diagram