POLITEKNIK
MALAYSIA
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LIFT SEAT

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DEPARTMENT OF MECHANICAL ENGINEERING

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Contents

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DEDICATION

To our father and mother, thank you so much for the support and encouragement of both of you for the good of your children. Many thanks to our dear brothers and sisters who helped so much without knowing how hard it is to see them succeed. Don't forget to also thank the thousands of guests and thank you to the visiting lecturer who has given us a lot of guidance and support in reviewing our project. In addition, we would like to thank the individuals, whether directly or indirectly involved in the project's success. Without all of you, the success of this project report would not have been possible in the best possible way. Also, to all the partners involved in the project, the time of the unexpected challenges and the sweet experience of the final project was very meaningful and very valuable. This will also enable us to move forward, which will serve as a bridge to life as a student this semester. Thankfully, we are grateful to be blessed with the gift of the one and only God, the Creator of the universe.

APPRECIATION

I would like to express my gratitude and appreciation to all those who gave me the possibility to complete this report.

This study is wholeheartedly dedicated to our beloved parents, who have been our source of inspiration and gave us strength when we thought of giving up, who continually provide their moral, spiritual, emotional and financial support.

A special thanks to our supervisor, Mrs. Nazratulhuda Binti Awang @ Hashim whose help, stimulating suggestions and encouragement, helped me to prepare our project especially in writing this report. As an experienced person, she also acts as a supervisor who has given a lot of guidance and criticism in every job he does as working in this field requires high efficiency and skill to facilitate the work process.

Thanks to "Zull Design Autotronic" for giving us the opportunity to do the project there, and thank you to the supervisors there for helping us and guide to build the "Lift Seat" project. To the supervisor who named Muhammad Fuad b Noorazmy are taught us over 3 weeks and worked hard to set up the 'Lift Seat until it would work. Even a lot of obstacles and problems encountered, a supervisor named Muhammad Fuad b Noorazmy successfully guided it. Thank you again to all "Zull Design Autotronic" supervisors who are able to provide us with the tips and ideas until late afternoon.

To our family, relatives, mentor, friends, and classmates who shared their words of advice and encouragement to finish this study. Special thanks to my teammates who have helped to finish this project and report.

And lastly, we dedicated this report to the Almighty God, thank you for the guidance, strength, power of the mind, protection and skills and for giving us a healthy life.

All of these, we offer to you.

ABSTRACT

The scope of this study focuses on designing and developing of the height-adjustable seat which is improvised by adding functions adjustable seat height from 30 cm up to a level lower. Selecting a perfect chair can be a difficult task which is required to consider every aspect including material, finish, ergonomics and budget. Lift Seat was designed to facilitate the movement of fluctuations in users without having to get up and sit down again. Designing a more ergonomic design making it easier for users in terms of comfort and provide aspects of the process of restocking and arrangement work, especially on the lower items in the mini-market. In addition, Lift Seat aims at users who have trouble sitting down and getting up, such as the elderly, people with disabilities and people who are bedridden. The Lift Seat is enhanced by adding the Scissor Lift concepts on the platform of the seat that aims to move vertically the person goods or boxes on a higher-order platform or on a shelf of existing goods. The objectives of this study are to design a chair with a height-adjustable function and fabricate initiatives chair that can be adjusted in height. This innovation resulted in a chair with the ability of the vertical movement from the floor until 30 cm height and can accommodate a person to 900 N.

CHAPTER 1

INTRODUCTION

1.0 INTRODUCTION

In the 21st century, a modern age, modern-in-year technology can provide the pleasure of humans. This modern technology can also speed up the country's economic market so much rapidly and competitive with world countries. Not only that, but modern technology can also save time for someone and reduce manpower in humans. Therefore, we plan to make a project that is a combination of chair and Scissor Lift that we use that concept. The name of this project is Lift Seat.

The Lift Seat is a design of the chair with height adjustable function and to fabricate initiatives chair that can be adjusted in height by using only a toggle switch to get the desired seat height. Besides that, Lift Seat suitable for those who have trouble sitting down and getting up. Normally who have those problems is a senior citizen. Not only that, but Lift Seat also designs with a more ergonomic design to making it easier for users in terms of comfort and provide aspects of the process of restocking and arrangement work, especially on the lower items in the mini-market.

1.1 PROBLEM STATEMENT

One of the problems that exist in our environment is difficulties to stand. The senior citizen has difficulty getting up / standing after sitting on the floor for too long. This problem is often seen when we make observations in places such as mosques, parents' homes, hospitals, and even homes where grandma has a hard time getting up.

On top of that, the problem is taking a lot of manpower. It especially the people with disabilities are called specialists in the Malaysian community. They have problems such as difficulty moving, getting up and so on due to a lack of limbs and no backers to help them.

The third issue concerns supermarket workers. What we noticed was that workers had trouble putting stockpiles on the shelves in the head. It could have been a minor accident when it happened to a supermarket worker and suffered a neck injury due to repeated work.

1.2 OBJECTIVES

The objective of the 'lift seat' project that we will achieve is to design a chair with adjustable heights and an initiative that will allow the chair to adjust to the height the user wants.

In addition, these 'lift seats' are also designed to facilitate the movement of users without having to get up and sit. It also makes the user enjoyable without having to spend a lot of energy getting up and sitting.

Finally, the lift chair design is ergonomic to make the user feel comfortable and comfortable. Not only that, this ergonomic design provides aspects such as the process of arranging and organizing stock items, especially such as low shelf conditions and having to bow to the supermarket. This will make it easier for users to launch their work.

1.3 SCOPE AND LIMITATION

This lift chair is designed or designed to make it easier for all users to use. This seat lifts also have the same scope and limitations as other items. The load that the lift seat can carry is 900N which is 90 kg. Each item must have a height that reaches the maximum level so it is just like a lift seat with a maximum height of 30 cm. This height is the same as the height of a 9-year-old. The use of 'lift seats' is appropriate for users who have trouble getting up and sitting like senior citizens.

1.4 ADVANTAGES AND DISADVANTAGES LIFT SEAT

There are many advantages to 'seat lift' products that we can take advantage of. One of these is that the paddle used on motorcycles can serve as a stick for the elderly who have trouble standing up and can even serve as a lift chair without having to lift it.

In addition, this lift chair can also be moved anywhere according to the user's wishes. This is because the design of the lift seat is ergonomic and user-friendly. This lift chair also uses the battery to lift and lower it. he doesn't have to use his hands to lift and lower him. it does not need to use your hands to lift and lower it, just press the switch. Lastly, this 'Elevator Seat' has wheels to move it. The wheels on the 'Lift Seat' have the user to wheel when the user is sitting so that there is no moving seat.

Where there are advantages, there are disadvantages. every product produced must have an inevitable drawback. This 'seat lift' can only hold 900 N for 90kg. Loads exceeding 90kg may cause the lift seat to fail.

The lift chair can also be elevated by 30 cm. This height has been set and cannot be adjusted to a height of over 30 cm. Height of 30 cm, may cause unstable lift. The weight of the lift seat is rather heavy as it is made entirely of solid steel. To move the lift seat to a high place through the stairs is likely to be a burden on the user who carries it.

1.5 CONCEPT LIFT SEAT

We use the concepts in this project is a scissor lift. A powerful lifting jack operates by the screw-in horizontal position that lengthens or shortens the horizontal diagonal of a parallelogram consisting of the linkages of the jack. By using existing the horizontal diagonal of a parallelogram consisting of the linkages of the jack.

By using existing concepts, we add improvements near scissor lift. The repeat function is to move something easily while the grip functions us that grip of stuff so that stuff does not move on your own. Designing a more ergonomic design making it easier for users in terms of comfort and provide aspects of the process of restocking and arrangement work, especially on the lower items in the mini-market.

1.6 SUMMARY OF IMPLEMENTATION

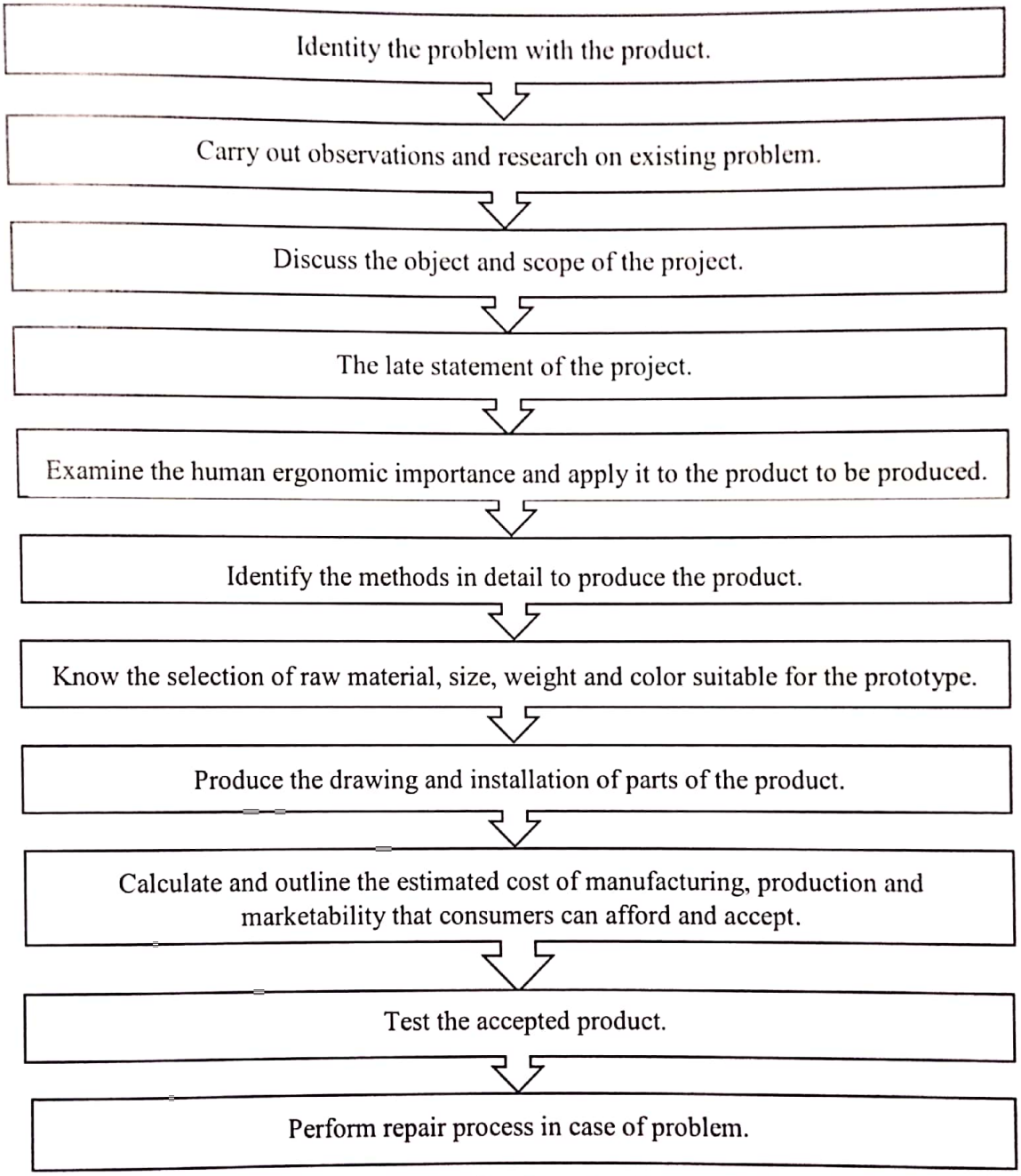

Figure 1.0 Project Planning Chart

CHAPTER 2

LITERATURE REVIEW

2.0 INTRODUCTION

This Lift Seat project is the result of an innovation from a common chair or better known as a 'Kerusi Kuliah' that is marketable and affordable at affordable prices. We renovated this 'Kerusi Kuliah' by incorporating a specially designed steel structure to place the Kerusi Kuliah on it.

We create this project with design a chair with height-adjustable function and to fabricate initiatives chair that can be adjusted in height. In fact, it aims to make it easier for users of all ages to get up from sitting on the floor. The function of Lift Seat is designed to facilitate the movement of fluctuations in users without having to get up and sit down again. The seat height can be adjusted by simply controlling the switch provided to the right of the seat. With this, it can reduce pain who has it.

The Lift Seat is enhanced by adding the Scissor Lift concept on the platform of the seat that aims to move vertically the person goods or boxes on a higher-order platform or on a shelf of existing goods. Designing a more ergonomic design making it easier for users in terms of comfort and provide aspects of the process of restocking and arrangement work, especially on the lower items in the mini market.

2.1 HISTORY OF SCISSOR JACK

a) 1963

In general, the appropriate shape of the scissor lifts and appropriate shape mechanism have been discovered by an engineer on 26 December 1960.The founder who successfully created this scissor lifts are Charles Larson who came from a company in Japan, Nagoya Kiko Co. LTD. In April 1966, Charles Larson created and completed the world's first scissor lifts but was not marketed as it was designed to assess the durability and suitability of the product as shown in figure 2.1. Charles Larson took several years to test the durability and suitability of the materials on each component to ensure they are safe for use by the public and so the scissor jack can last a long time. During the manufacturing and testing period of the product, he issued a capital of approximately 100,000,000-yen equivalent to RM 3,659,150.00

Figure 2.1 Description of the scissor lifts designed by Charles Larson

b) 1970

After being satisfied with all the aspects that have been tested and examined at the angle on the scissor lifts of its creation, in the 1970s, this scissor lifts were launched and marketed internally on the local market. It is marketed and focused on industries requiring high-altitude work places such as for parking, washing on high floors, reaching high-end items and so on. Company Nagoya Kiko Co.LTD has established technical cooperation relationship with John Burton Machine Co (USA) on positive action delivery system. Scissor lifts is marketed at a price of around 200,000,000 yen which is estimated at

RM7,320,986.34 which is double the amount of capital issued to create this scissor jack.

Furthermore, the producer company continues to expand its branch with technical cooperation with Holstein & Kappert Inc. (Germany) regarding food machinery. Further, around 1971 to 1974, the company continued its technical cooperation with several other big companies at the time, among which was from a robotic company from USA on the reproduction of robots for industrial use. In addition, Industrial Automation Systems Inc. (USA) on Accuma Flow also fuses technical cooperation with the manufacturer and company Hight Co., Ltd. Establish agreement on manufacturing and selling processes.

c) 1976

Scissor lifts JLG is the first US-based business company to market and sell the scissor lifts that has been available chemically. The JLG scissor lifts company has been innovated that allows the scissor lifts to transform the original shape designed by Charles Larson to easily repairable and maintenance scissor lifts and easy-to-use component items. At the same time, many other overseas companies have also started innovating and designing existing scissor lifts to various other forms.

However, in general the first company has changed the original shape of the scissor lifts designed by Charles Larson is the JLG Company. After that, there are several other companies trying to innovate the scissor lifts to be more effective and easier to use and easy to maintain. The designed and innovated scissor lifts focus mainly on the use of manufacturing and industrial industries that require high-performance and high-performance workers in shelves or shelves.

d) 1977

The Japanese business company Meikikou has agreed to collaborate with a US-based manufacturer who first founded the scissor lifts. The Meikikou Company has released a new scissor jack in the form and brand new N-series. The Scissor jack was launched in the second quarter of 1977 in Japan focusing

on the function to lift loads like a box using the Hydraulic system to move and adjust the scissor lifts. In 1978, the Company renewed their scissor lifts by adding height limits and could lift more and heavier loads and loads by putting the item in place provided and subsequently controlled by the worker moving from below.

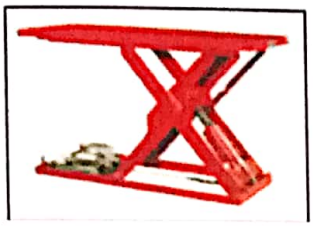

Figure 2.2 Scissor lifts "N series"

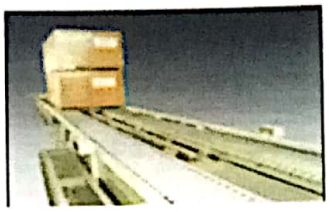

Figure 2.3 Picture scissor lifts in 1987

e) 1980

In the mid-1980s, another scissor jack (lift) has been created with different shapes and functions that have been named Hy-Brid lifts that can function as 2 in 1 and are widely used in some situations in the mausoleum.

f) 1995

In the following year, the company of Meikikou had innovation the existing scissor lifts that make in the 1977 with name 'Hyper Series'. It uses the same concept but the difference is the size and height. This company produce 3 types of 'Hyper Series' like in the figure 2.4. That height product can be adjusted. It is also suitable for use in small industries or big industries.

In the same year, the company of Meikikou have create scissor lifts with the name 'Endeavor Series' (figure 2.5) with use the concepts hydraulic system. The crisscross 'X' which use to raise the platform up there is on pressure imposed to use.

Figure 2.4 Hyper Series

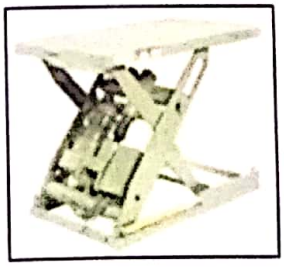

Figure 2.5 Endeavor Series

g) 1998

At around 1998, the scissor lift was created with the design is named 'Jasper Series'. It has a lot crisscross 'X' blades. It also has 2 adjustable heights as shown in the figure 2.6.

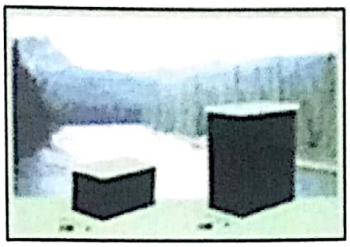

Figure 2.6 Jasper Series

h) 1999

In this year that have three different types of scissor lifts. It started with the scissor lift named 'Long Table Series' (figure 2.7) and 'Tough Series' (figure 2.8). 'Long Table' is designed with magnifying the size and width of the platform. It is suitable for the big industry. Next, scissor lifts with the name 'Caribon Series' (figure 2.9) and 'New Envendor Series' (figure 2.10) have been marketed. This two scissor lifts use the concept hydraulic that one can control and re-order the desired height. Scissor lifts Power Arm Series have been design by company Meikikou with the big size as shown in figure 2.11.

Figure 2.7 Long Table Series

Figure 2.8 Tough Series

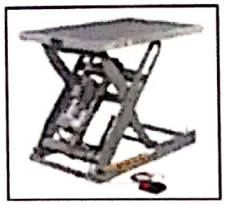

Figure 2.9 Caribon Series

Figure 2.10 New Envendor Series

Figure 2.11 Power Arm series

i) 2000

In this year, 'Stringray Series' as shown in figure 2.12 have been created by Meikikou company but this scissor lift size have been change by being a small size.

Figure 2.12 Stringray Series

j) 2001

In this year, scissor lifts have been innovation with 45 varieties on scissor lifts Endeavor Series (figure 2.13) that have be launched on 1995. It has the height to achieve or put goods on high height.

Figure 2.13 Endeavor Series

k) 2002

Meikikou company are created one more scissor lift with the shape and different functionally. This year, Meikikou has development of scissor lift, 'Clean series' complies with clean room as shown in figure 2.14.

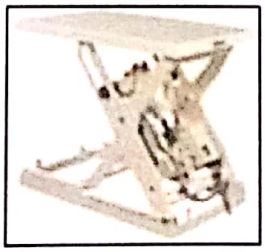

Figure 2.14 Clean Series

l) 2003

Earlier, the Meikikou Techno Corporation Company only issued scissor lifts. Around 2003, the company of Meikikou Techno Corporation has created a Wheelchair Lifts (figure 2.15). This will facilitate to OKU or pain users to move to high places. Wheelchair Lifts is also suitable for use in hospital.

Figure 2.15 Wheelchair Lifts

m) 2004

Around 2004, scissor lifts have a variety of different altitude. Among the height is 120mm, 180mm and 240mm. Although the scissor lifts altitude is different, it uses the same concept and size. Therefore, the 'Cam-Diverter has been launched as shown in figure 2.16.

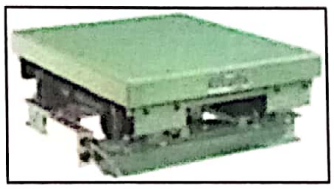

Figure 2.16 Cam – Diverter.

n) 2005

In conjunction with the 50-year establishment of Meikikou Techno Corporation Company, this company has innovated new products named 'Endeavor Series' which have 22 narrow width.

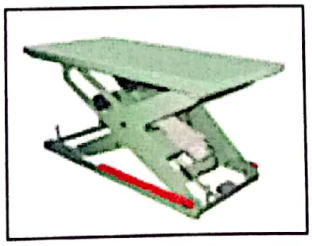

Figure 2.17 Endeavor Series with 22 narrow width.

o) 2010

In 2010, the company had issued a scissor lifts named 'Endeavor series' who had the advantages could lift a burden of 200 kg as shown in figure 2.18.

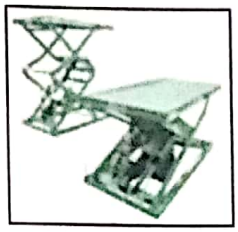

Figure 2.18 Endeavor Series

p) 2011

In 2011, the Meikikou Techno Corporation Company has issued 2 types of scissor lift. Among them, 'Wash Series' and 'Endevor Series'. One of the advantages of the 'Endevor Series' is to lift the goods or burden by 3 tons and 4 tons.

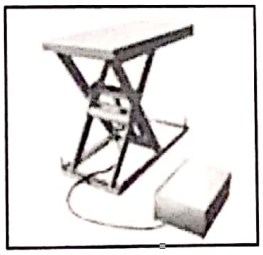

Figure 2.19 Wash Series

Figure 2.20 Endevor Series

2.2 MECHANICAL JACK

A jack is mechanical device used to lift heavy loads or apply great forces. Jacks employ a screw thread or hydraulic cylinder to apply very high linear forces. A mechanical jack is a device which lifts heavy equipment. The most common form is a car jack, usually jack or garage jack which lifts vehicles so that maintenance can be performed. Car jacks usually use mechanical advantages to allow a human to lift a vehicle by manual force alone.

2.3 SCISSOR JACK

Scissor jacks are also mechanical and have been in use at least since the 1930s.A scissor jack is a device constructed with a cross-hatch mechanism, much like scissor, to lift up a vehicle for repair or storage. It typically works in just a vertical manner. The jack opens and folds closed, applying pressure to the bottom supports along the crossed pattern to move the lift. When closed, they have a diamond shape.

Scissor jack are simple mechanisms used to drive large loads short distance. The power screw design of a common scissor jack reduces the amount of force required by the user to drive the mechanism. Most scissor jacks are similar in design, consisting of four main members driven by a power screw.

As scissor jack is operated simply by turning a small crank that is inserted into one end of the scissor jack. This crank is usually "Z" shaped. The end lift into a ring hole mounted on the end of the screw, which is the object of force on the scissor jack. When this crank is turned, the screw turns, and this raised the jack. The screw acts like gear mechanism. It has teeth (the screw thread), which turn and move the two arms, producing work. Just by turning this screw thread, the scissor jack can lift a vehicle that is several thousands of pounds.

Scissor jack an available in various concepts like electronic scissor jack, hydraulic scissor jack and manual scissor jack. All the type of concepts have own benefits such as;

- The most common and familiar type of scissor jack to most consumers, though, is a manual jack. This type of jack stand is smaller, and is included with many new or used vehicles. The manual jack often fits into a trunk compartment, and it's part of what car buyers get, along with a spare tire, to help them fix any roadside flat tire situations. For a used car buyer, it's helpful to look into the trunk of the vehicle and make sure that these tools are available, along with an owner's manual.

- The manual scissor lift jack uses a long handle piece that is a lot like a wrench. The jack user inserts the handle into a point on the jack stand, and turns it, expanding or contracting the "scissor" pieces by threading them through a long, horizontal bolt.

- Manual scissor jacks are often used for raising just one corner of a vehicle. The user positions the jack directly behind the wheel and jacks up that side of the vehicle to work on a flat tire or damaged wheel.

2.4 THE MECHANISM OF SCISSOR JACK

A scissor jack uses a simple theory of gears to get its power. As the screw section is turned, two ends of the jack move closer together. Because the gears of the screw are pushing up the arms, the amount of force being applied is multiplied takes a very small amount of amount of force to turn the crank handle, yet that action causes the brace arms to slide across and together.

As this happen the arms extend upward. The ear's gravitational weight is not enough to prevent the jack from opening or to stop the screw from turning, since it is not applying force directly to it. If you were to put pressure directly on the crank, or lean your weight against the crank the person would not be able to turn it, even though your weight is a small percentage of cars.

2.5 SPECIFICATIONS

The term "scissor jack" describes a wide variety of tools that all follow the same principle by using crossed beams to lift something. They do this by acting on the object they are lifting in a diagonal manner, the lift on the right side lifts the objects from its left side and vice side. This allow the user to store the jack when it is not in use (with the diagonal beams flat) and expand it when it is needed. The example of the tool can be shown in figure 2.21.

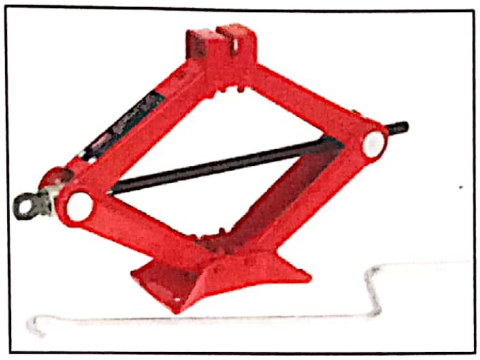

Figure 2.21 Scissor jack

The major specification of scissor lifts is that they are all symmetrical. In order to work the distance from the loaded point to the cross point must be the same as the distance from the cross point to the ground. This ensures that weight is distributed equally throughout the scissor beams. Since scissor lifts have such a wide variety of use, they also have a wide variety of power sources. Scissor lift for lifting cars can be powered electrically, hydraulically and of course mechanically. On the other end of the spectrum, industrial scissor lifts that people stand and are often powered by diesel, although electrical options do exist. Scissor lifts basically fall into two categories: single scissor lifts and multiple scissor lifts. A single scissor lift has just two crossbeams and one "x. This means can only go so high because the length of the crossbeams restricts the height of the lift, and making them too lung would make it unstable. On the other hand, multiple lifts have beams crossing each other, and the attaching to more beams that go the opposite direction. This allow the scissor jack lifts to rise higher.

2.6 SCISSOR LIFT

A scissor lift is a type of perform that can usually only move vertically. The mechanism to achieve this is the use linked, folding supports in a crisscross 'X' pattern, known as a pantograph (or scissor mechanism).

A pantograph is mechanical device that is made of links. It bends on order to allow a user to draw an image while simultaneously drawing two or more copies of it. Pantograph can also make smaller or larger copies of an original drawing. They have been used for over four hundred and have many purposes, although their use in modern times in generally restricted to purely mechanical applications.

The upward motion is achieved by application of pressure to the outside of the lowest set of supports, elongating the crossing pattern, and propelling the work platform vertically. The platform may also have an extending deck to allow closer access to the work area, because of the inherent limits of vertical – only movement. Scissor lift are usually diesel – powered. The platform be lowered without using the power system, by releasing the hydraulic or pneumatic pressure.

The construction of the scissor action can be hydraulic, pneumatic or mechanical (via leadscrew or rack and pinion system). Depending on the power system employed on the lift, it may require no power to enter "descent" mode, but rather a simple release of hydraulic or pneumatic pressure. This is the main reason that these methods of powering the lifts are preferred, as it allows a fail-safe option of returning the platform to the ground by release of a manual valve.

2.7 TYPE OF SCISSOR LIFT

a) Scissor Lift (hydraulic)

Hydraulic scissor lifts are a typical example of the efficient use of hydraulic power. These lifting are used extensively throughout industry as well as vehicle scissor lifts for car repairs. Fixed installed are often used to lifts goods between floor levels from vehicle into a building at the goods inwards areas. Mobile scissor lifts are normally small lightweight lifts are used to push goods or heavy objects around a factory or workshop. Using 12 V or 24 VDC hydraulic power packs these lifts must be re-charged just like a forklift.

b) Scissor Lift (pneumatic)

Pneumatic scissor lift is the perfect lifting and work positioning solution. Utilizing constant shop air, it seamlessly allows an operator to position a load for loading / unloading. Equipped with ergonomic technology, is extremely easy to use and reduces the risk of worker fatigue or injury. The streamlined design ensures it can be integrated into a number of working environments. It is build to handle goods and move products without risk of damage. There are many type of scissor lift such as pneumatic scissor lift tables achieve lift via a heavy-duty airbag system, pneumatic scissor lift with optional valve stand and so on. Pneumatic scissor lift contains no electrical or hydraulic components, therefore it's virtually maintenance free.

c) Scissor Lift (mechanical)

Mechanical scissor lifts can come in a single or multi-stage lifting capacity. To reach higher height you want a multi-stage scissor lift. Mechanical scissor lift can be built to withstand enormous loads and to raise and lower those lads safety and ergonomically. Every industry involved in manufacturing has a place for mechanical scissor lift in their operations.

2.8 HOW DOES SCISSOR LIFT WORK?

Scissor lifts are type of equipment designed for lifting objects or individuals according to one's preferences. Unlike other platforms, these lift move only vertically to transport materials, people or equipment. Scissor lifts are widely used in construction and manufacturing industry where it is a need for workers to do job on hard to reach heights and spaces.

The body of the scissor lift that is holding the platform used to carry materials or people has foldable support that looks like a crisscrossed 'X' pattern linked together. The body is known as the pantograph which is the lifting mechanism. Pantograph functions like a spring where in the elevation or upward motion takes place due to the application of pressure. Its length and size is defined by the expansion and construction of the body of the scissor lift.

The main feature of a scissor lift that makes it so unique is the fact that is doesn't use a straight support to raise its platform. The platform is instead raised by drawing the folded supports underneath it together. As it expands, the scissor lift can be raised to various heights, depending on model and make, and is powered by hydraulics or electric motor, which means it can be used in almost ant setting. Normally a scissor lift does not need any power when the platform has to be lowered, which makes it a very safe industrial vehicle choice, as workers cans safely descend in the event of a power outage.

2.9 HOW TO AVOID STEEL RANGE?

i. Covering iron or other metal with special iron paints sold in building materials stores.

ii. Make metal with the same or homogeneous mix when making or producing other iron or metal in the mill.

iii. On the surface of the oil is given oil or Vaseline

iv. Connect with active metals such as magnesium / Mg via wire so that rust is magnesium. This is mostly done to prevent iron or steel rods. Mg is planted not far from the electrical poles

v. Perform galvanizing process with iron metal coating with zinc or tin which is located to the left of the series of voltages.

vi. Perform electro-chemical processes by providing tin layers as is usually done on cans.

2.10 SYSTEM LEVER

A lever is a rigid bar that moves on a fixed point called the fulcrum, when a force is applied to it. Movement is made possible in the human body by lever systems which are formed by our muscles and joints working together. Scissor jack lift project used by us is using the third-class lever. It because the effort is applied between the load and the fulcrum. There are several types of system lever (figure 2.22):

i. First -class lever

In a first-class lever, the effort is applied at one end of the lever and the load is at the other, with the fulcrum somewhere between. Seesaws and scissors are first-class levers. First-class leverage also occurs when you lift your head off your chest. Some first-class levers in the body operate at a mechanical advantage (for strength), but others, such as the action of the triceps muscle in extending the forearm against resistance, operate at a mechanical disadvantage (for speed and distance).

ii. Second-class lever

In a second-class lever, the effort is applied at one end of the lever and the fulcrum is located at the other, with the load between them. A wheelbarrow demonstrates this type of lever system. Second-class levers are uncommon in the body, but the best example is the act of standing on your toes. All second-class levers in the body work at a mechanical advantage because the muscle insertion is always farther from the fulcrum than the load. Second-class levers are levers of strength, but speed and range of motion are sacrificed for that strength.

iii. Third-class lever

In a third-class lever, the effort is applied between the load and the fulcrum. These levers are speedy and always operate at a mechanical disadvantage – think of tweezers and forceps. Most skeletal muscles of the body act in third-class lever systems. An example is the activity of the biceps muscle of the arm, lifting the distal forearm and anything carried in the hand. Third-class lever systems permit a muscle to be inserted very close to the joint across which movement occurs, which allows rapid, extensive movements (as in throwing) with relatively little shortening of the muscle. Muscles involved in third-class levers tend to be thicker and more powerful.

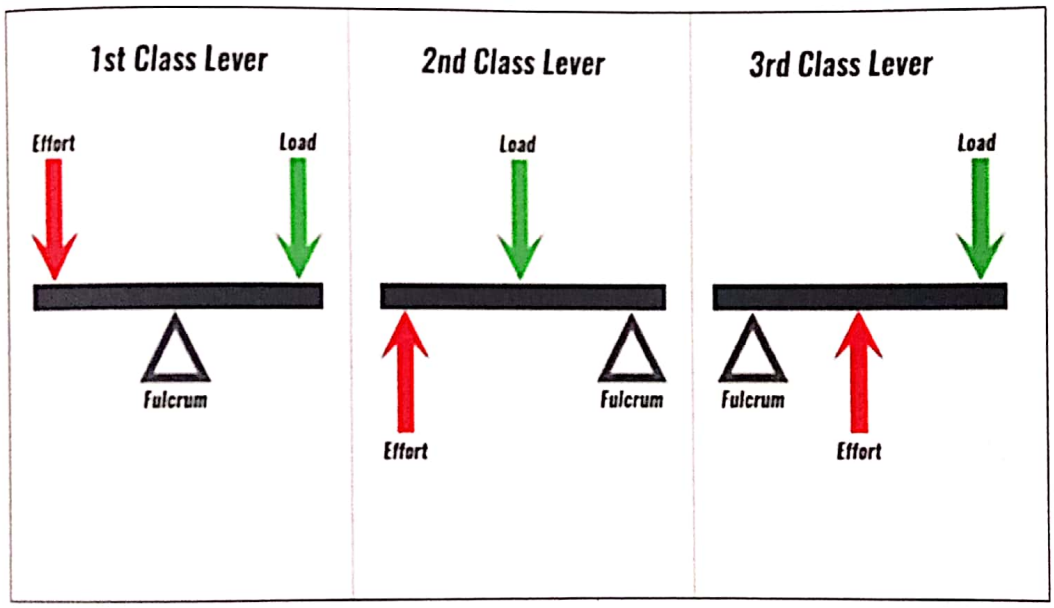

Figure 2.22 System lever

CHAPTER 3

METHODOLOGY

3.0 INTRODUCTION

As we know in every product or project's product or project, the main or scope of the worship and very important before the production of a product or project is a design. Design or known by the simple language of 'project painting' is a process where to plan and ensure that aspects of the material are used, arrangement, and structure of materials according to specifications in the production of a product.

Among its factors are based on the function, appearance material suitability. Durability, product costs, safety and commercial value. In production a design, a designer is very much needed in the construction of design based on the needs and needs of consumers according to current circulation.

3.1 FLOW CHART PLAN OF PROJECT

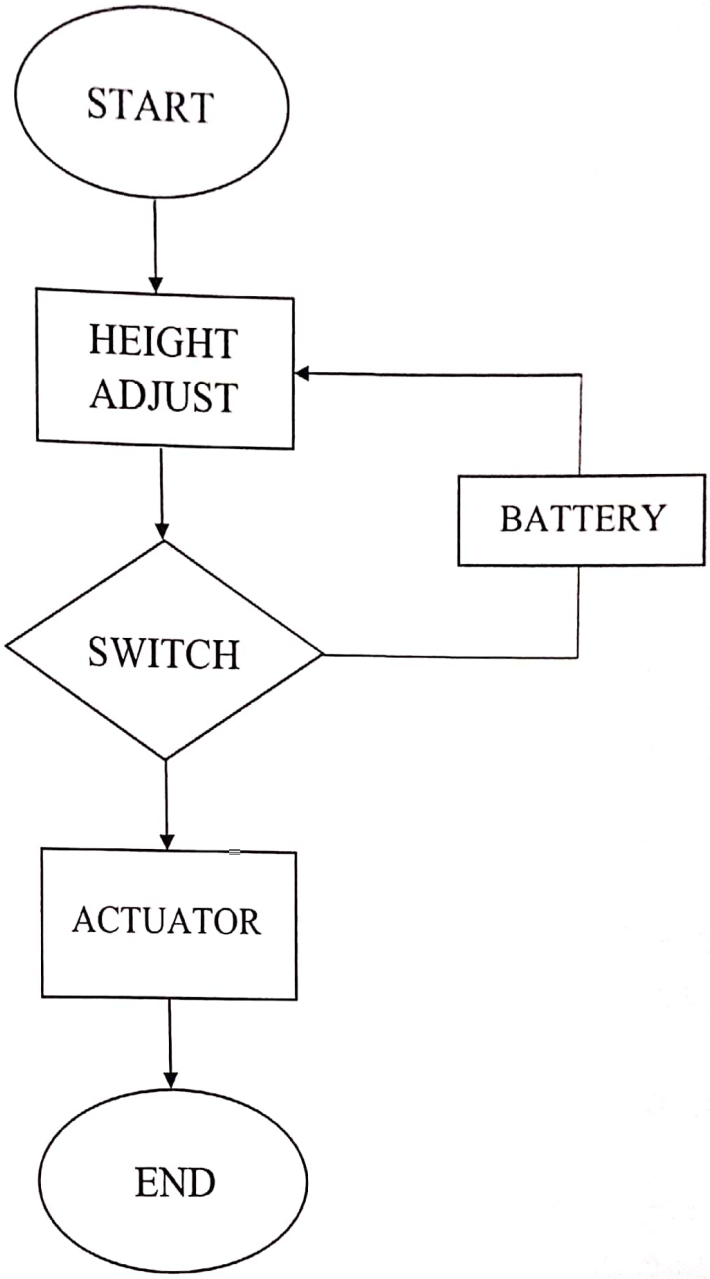

Figure 3.1 Methodology flowchart

3.2 GANNT CHART

Table 3.1 Gantt chart of the project

	WEEK 1	WEEK 2	WEEK 3	WEEK 4	WEEK 5	WEEK 6	WEEK 7	WEEK 8	WEEK 9	WEEK 10	WEEK 11	WEEK 12	WEEK 13	WEEK 14	WEEK 15
CHAPTER 1															
1 RESEARCH IMPLEMENTATION															
1.0 Introduction															
1.1 Problem statement															
1.2 Objectives															
1.3 Scopes and limitation															
CHAPTER 2															
2 LITERATURE REVIEW															
2.0 Introduction															
2.1 History of scissor lift															
2.2 Mechanical jack															
2.3 Scissor jack															
2.4 How does scissor jack work?															
2.5 Specifications															
2.6 Scissor lift															
2.7 Type of scissor lift															
2.8 How does scissor lift work?															
2.9 System lever															
2.10 Concept															
2.11 Material															
2.12 How to avoid steel range?															
2.13 Assembly															
CHAPTER 3															
3 RESEARCH METDOLOGY															
3.0 Flow chart plan of project															
3.1 Drawing															
3.2 Budget															
3.3 Gannt chart															
3.4 Analysis															

3.3 PRODUCT DESIGN

Each created product must have benefits and goodness to consumers. Our products are purpose in the surrounding community they can benefit as well as possible.

The purpose of the Lift Seat design is to reduce the burden and problems on the senior citizen and disable people. This is because, they has problem to getting up and down after a long time seat on the floor. Not only that, the Lift Seat also aim to reduce the problem the employees who are exhausted to put the stuff on shelves in a bow down position. With ergonomic design, it will facilitate the movement.

Lift Seat also suitable for a hospital as it combines a seasonal ordinary seat with wheelchair. The synchronization are down and rise automatically will be easier to any party. Where it will make it easier for the patient to be transferred from chair to the bed or the opposite.

3.3.1 Drawing

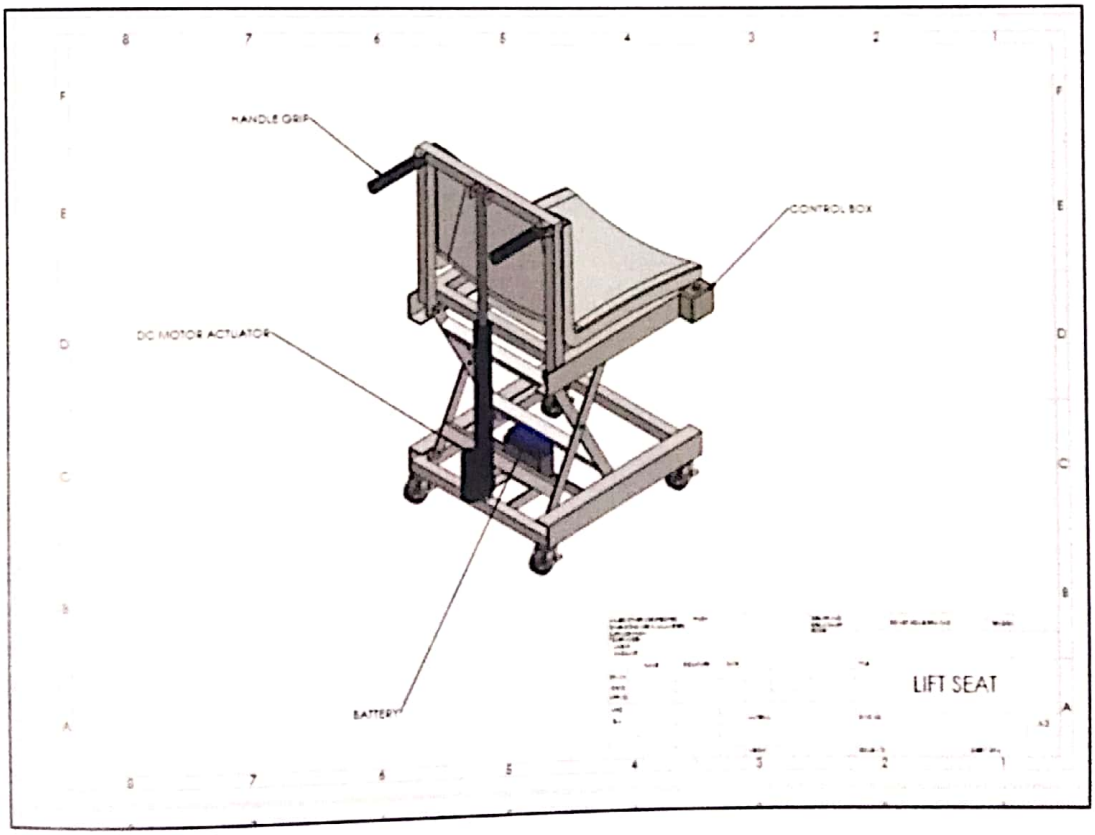

Figure 3.2 Complete drawing of lift seat

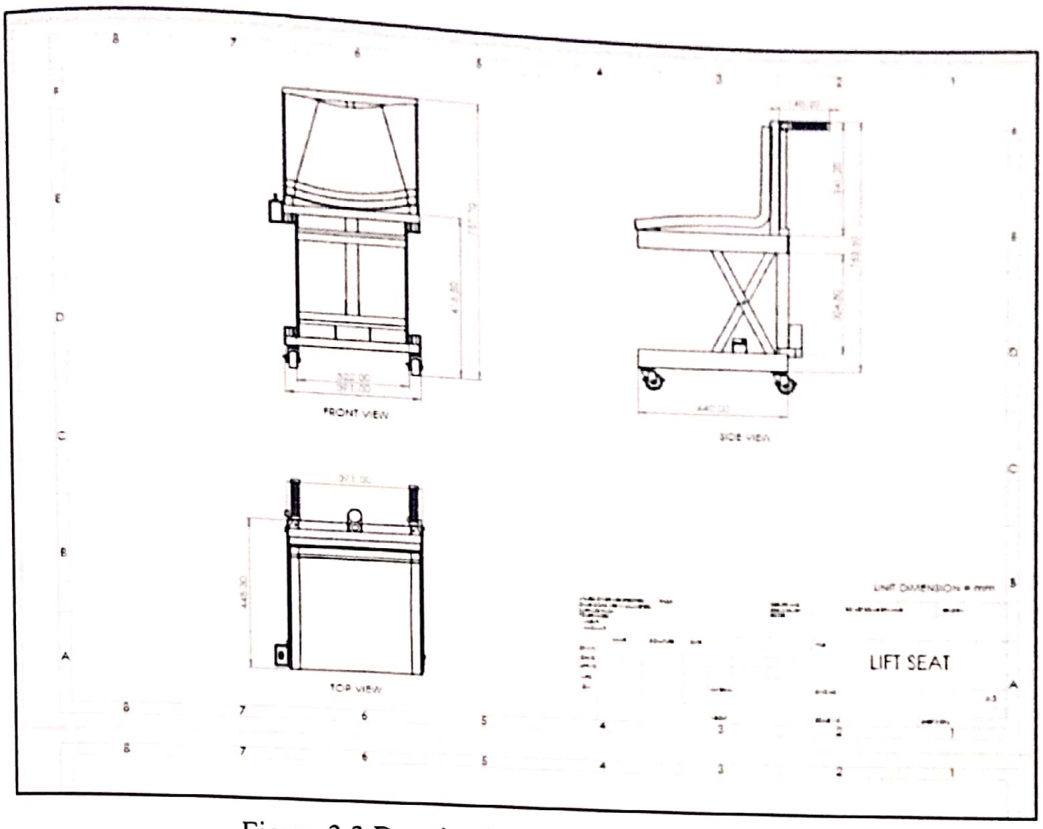

Figure 3.3 Drawing in a front, side and top view

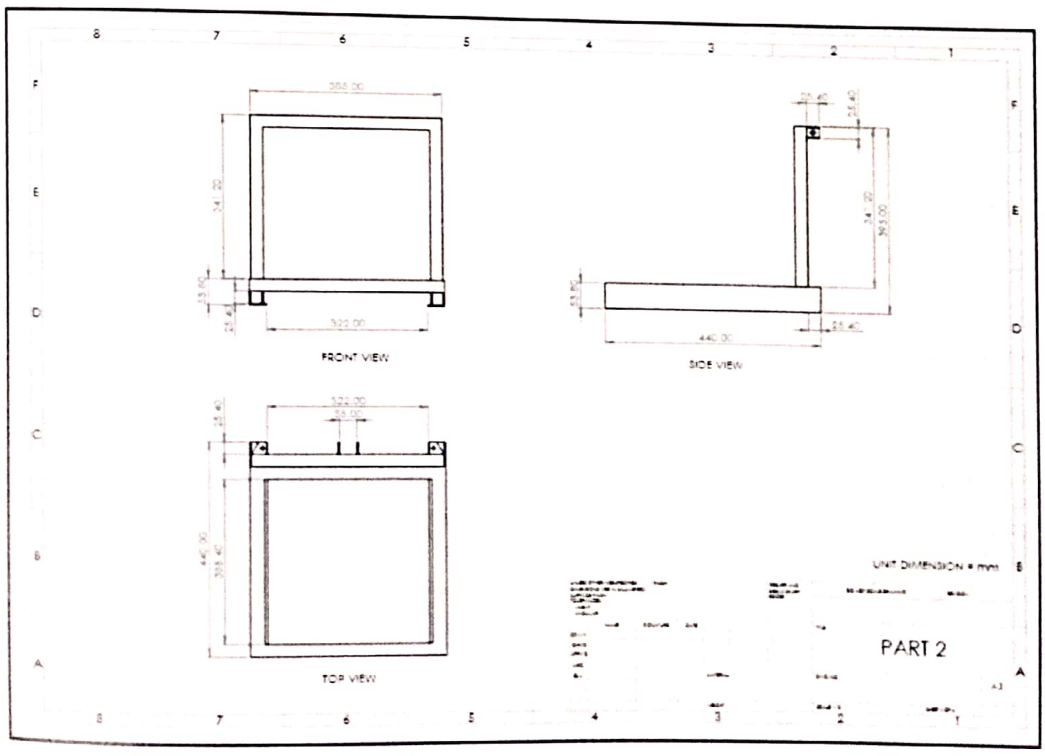

Figure 3.4 Drawing of metal frame in position front, side and top view

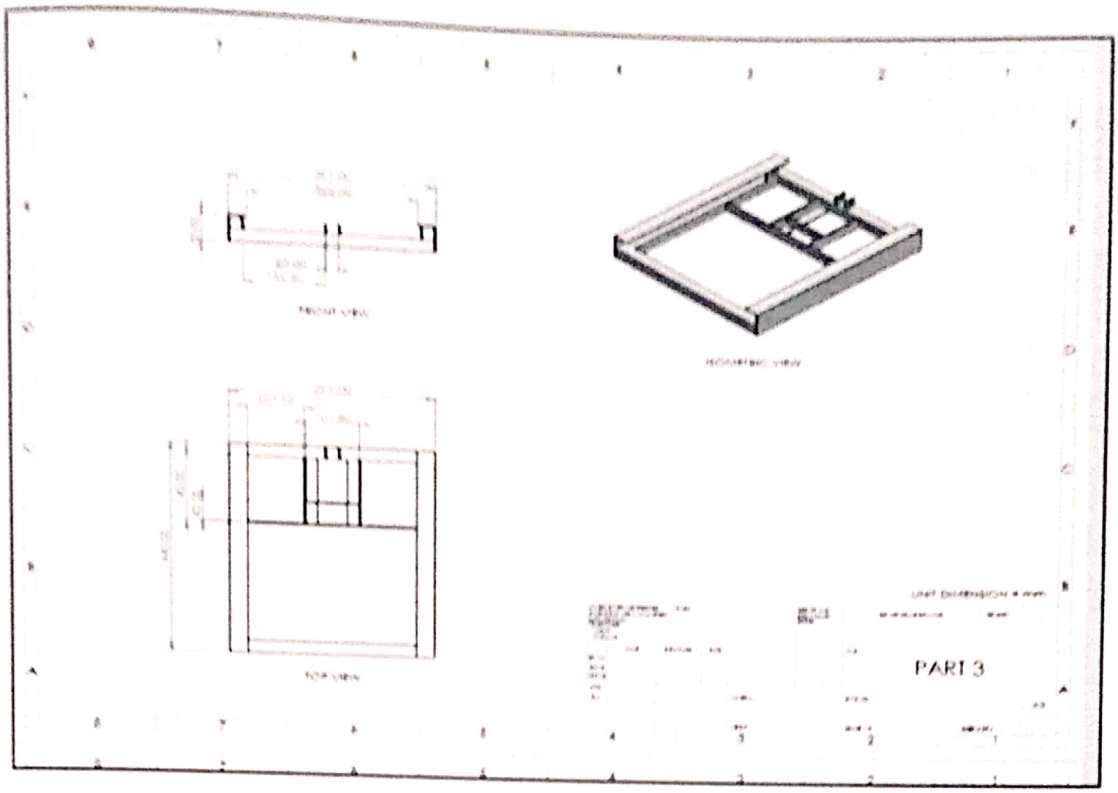

Figure 3.5 Drawing of bottom metal frame seat in front and top view

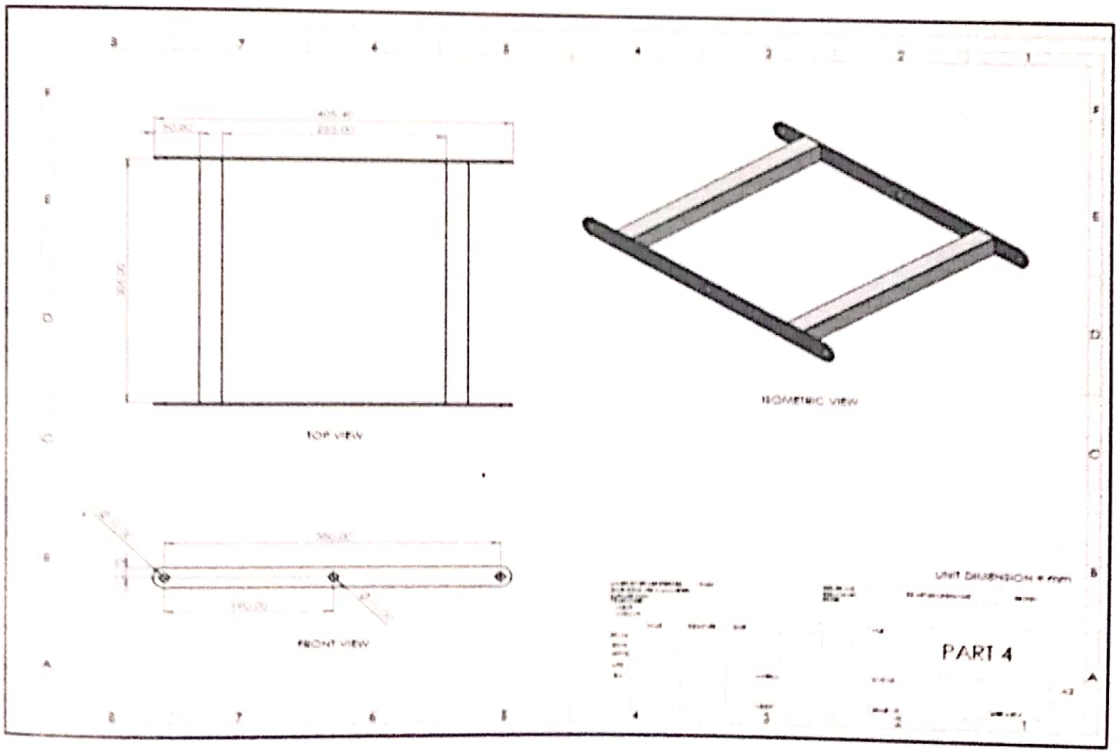

Figure 3.6 Drawing of the 'X' scissor lift

3.4 PHYSICAL REQUITMENT

To create a good project design is important in keeping up with current trends and taking into account marketing costs as well as consumer satisfaction should also be taken into consideration. On the other hand, user safety and comfort factors are the most important elements when implementing this project. This is because to give our customers the satisfaction of out product service. In addition, the project outline must follow the specifications and logical logic in order for the project to work successfully.

3.4.1 Neatness

Fineness is also the most important aspects of producing a product. Through neatness, outsiders or users will evaluate the success and reliability of our product. From there, the neatness is important. Through the finely tuned texture, a product will look and attractive.

The seat of the lift chair is located on the scissor lift below the bench. Scissor lift installation is important as it is a key step in the manufacture of seat lift. It should look neat and in accordance with the predetermined size. In addition, the choice of spray color is also selection will influence and attract the user.

3.5 PROJECT TOOL SELECTION

a) Measuring tape

Is used to measure the length, width of material, depth and even the thickness of a material or product to be used before the cutting process. Has readings in centimeter and millimeters.

Figure 3.7 Measuring tape

b) L square

"**L**" **square** is one of the most basic of the pattern making rulers. This ruler helps to create accurate 90° angles and straight edges. It measures, rules, and squares simultaneously. Hip Curve The hip curve helps to shape the hip line, hem, and lapels.

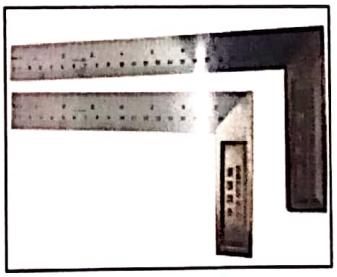

Figure 3.8 L square

c) Combination spanner

Combination spanners have two heads: one with an open-ended profile and the other with a ring profile. Combination spanners are hand held tools used for fastening and loosening nuts or bolt heads with a hexagonal shape.

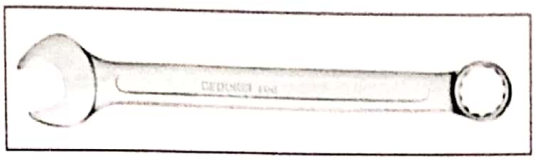

Figure 3.9 Spanner

3.6 MACHINE USES

a) Iron cutting machine

A cutting tool or cutter is any tool that is used to remove material from the work piece by means of shear deformation. Cutting may be accomplished by single-point or multipoint tools. Single-point tools are used in turning, shaping, planning and similar operations, and remove material by means of one cutting edge. Milling and drilling tools are often multipoint tools. It is a body having teeth or cutting edges on it. Grinding tools are also multipoint tools.

Figure 3.10 Iron cutter machine

b) Grinder

Angle grinders may be used for removing excess material from a piece. There are many different kinds of discs that are used for various materials and tasks, such as cut-off discs (diamond blade), abrasive grinding discs, grinding stones, sanding discs, wire brush wheels and polishing pads.

Figure 3.11 Grinder

3.7 MATERIAL USES

a) Mild steel hollow (1" x 1" x 1.2 mm)

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. 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, especially rectangular sections, are commonly used in welded steel frames where members experience loading in multiple directions. 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. The flat square surfaces of rectangular HSS can ease construction, and they are sometimes preferred for architectural aesthetics in exposed structures, although elliptical HSS are becoming more popular in exposed structures for the same aesthetic reasons.

Figure 3.12 Mild steel hollow

b) Mild Steel Plate

Mild steel is the most commonly used steel. It is used in the industries as well in the different everyday objects we use. Even the pans and spoons of the kitchen are sometimes made of mild steel. The main target of this article is to discuss about different mild steel properties. The mild steel is very important in the manufacturing of metal items. Almost 90% steel products of the world is made up of mild steel because it is the cheapest form of steel.

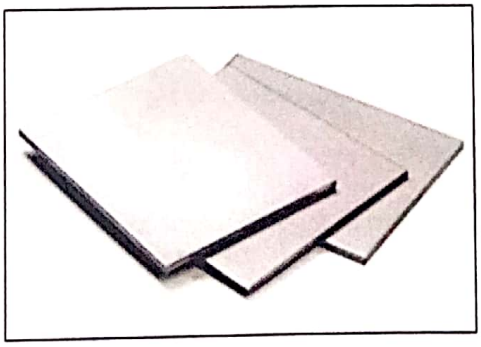

Figure 3.13 Mild Steel Plate

c) Mild Steel Bolt & Nuts

The nuts, bolts and fasteners are made from a variety of aluminum alloys. These are generally with elements such as silicon, iron, magnesium, manganese, copper and much more. Main material types that use in making nuts, bolt

d) Steel

Be it a threaded bar or a nut, bolt and fastener, steel is a most commonly used material. Due to its abundance, it is widely available and can be obtained from iron ores with various surface treatments as well. Some of these treatments are galvanization, zinc plating and chrome plating. The grade of steel required depends upon the user's requirements. Overall, there are 4 different steel grades in which nuts, bolts and fastener are available.

e) Alloy steel

Bolts made from alloy steel have extreme strength. They are separately heated to incorporate the added strength. An anchor bolt, for instance, that is made from alloy steel is not coated and has a dull black finish. As the bolts are strong, nuts made from this material are brittle at the same time.

f) Brass

Brass is an alloy of copper and zinc. Although this alloy is used very rarely due to its relative softness but the fasteners which are made from brass are highly corrosion resistant as well as electrically conductive.

g) Silicon bronze

It is generally known as Bronze and it a mixture of copper and tin. Small amount of silicon is also present in it. The nuts and bolts that are made from it are mainly catered towards marine environments. Also this alloy is preferred over stainless steel is wooden structure construction too. For example, the fasteners instilled on a wooden boat made up of silicon bronze.

h) Aluminum

This is a light weighted, soft but highly corrosion resistant metal which is much a like stainless steel. The nuts, bolts and fasteners are made from a variety of aluminum alloys. These are generally with elements such as silicon, iron, magnesium, manganese, copper and much more.

Figure 3.14 Mild Steel Bolt and Nuts

i) 12 VCD Actuator

A linear actuator is a cleaner and more efficient alternative to hydraulic and pneumatic solutions. Electric linear actuators convert rotary motion of gears and a ball or lead screw into straight, or linear, motion for accurate, repeatable performance of pushing/pulling, raising/lowering, rotating or positioning loads. Linear actuators are commonly used in applications such as agricultural machines and equipment, medical devices, factory automation, material handling and many others.

There are a wide range of actuators that are categorized as linear, precision, stepper motor and rod less.

i) Linear actuators are used in all types of equipment to automate processes, remove people from dangerous situations, provide remote control or make difficult/tedious/manual jobs easier.

ii) Precision linear actuators are designed for applications that required higher speed, higher loads, continuous duty cycle, precise positioning and flexible integration in tight areas.

iii) Stepper motor linear actuators combine a hybrid stepper motor and a precision lead screw in one compact envelope, suiting applications

where external guidance is present or a high level of design flexibility required.

iv) Rodless linear actuators are also known as linear motion systems.

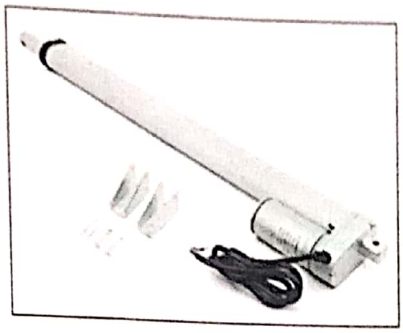

Figure 3.15 12 VCD Actuator

j) Angle Iron

Angle iron is formed in a specific shape to be extremely stable and able to bear excessive amounts of pressure and weight. Normally bent into an L-shape (always 90 degrees), angle iron is often used to frame or built various pieces of furniture, supporting structures, walls or shelves. Angle iron in the project use for built frame at platform.

This is some of benefit use angle iron such us;

i. Have been recycling steel for over 150 years

It sounds amazing. but recycling efforts for steel such as angle iron has been going on since the 1800s. Most of the steel objects that you use in your life can contain from 25 percent up to 100 percent of recycled steel. So, you are in fact contributing to a greener environment without even knowing it.

ii. Steel is 100 % recyclable

Not many objects can be recycled as fully as steel. From metal beams to aluminum cans, steel can be remade into other objects over again. For the household objects that we don't need anymore, the steel is taken to material recovery facilities where it becomes processed. For larger steel objects and bales, these objects are melted in furnaces at refineries before turned into new steel. Beam and angle iron can also

be given to steel suppliers as is so other companies and individuals can purchase the materials for the construction and personal projects.

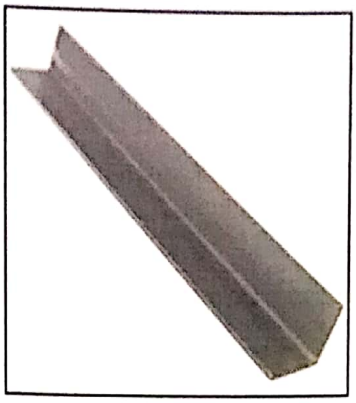

Figure 3.16 Angel Iron

k) Plastic chair

Plastic chair is made from injection molding machine. Injection molding is the fastest and cheapest technique used to manufacture plastic chairs. All you need is Injection molding equipment, material and mold. Material used for manufacturing chair is Polyethylene terephthalate also known as PET. It has good mechanical properties and good corrosion resistance of thermal radiations.

The process to make plastic chair is plastic pellets are added in the hopper and is heated above its melting point. These are then sent in an injection molding machine. These are then pressed and squeezed into the mold then they are separated to get to get the molded chair. These are then cleaned by removing the burr present on the part. After this sharp corner are removed and finishing operations are done on it to make it shine.

Figure 3.17 Plastic Chair

l) Paddle

Paddle that we used in our project called Lift Seat is a regular paddle used on motorcycle to put the foot on while riding a motorcycle. Our idea came to light when the issue of how this Lift Seat can make it easier for users to push it without lift it. Therefore, we think that a regular paddle used on motorcycle can be used for holders of Lift Seat. The paddle is easy to control. If you want to use it, just open. When done, just close it.

Figure 3.18 Paddle

m) 12 VCD Battery

Battery is a battery device consisting of one or more electrochemical cells with an external connection provided to electrical devices such as flashlights, smart phones and electric cars. When the battery supplies electricity, its positive terminal acts as a cathode while its negative terminal acts as anode. This "anode" is the source of the electron that flows and transmits energy to the external device to which it is connected. When the battery is connected to an external circuit, the electrolyte acts as an ion inside it, allowing chemical reactions to be performed on separate terminals and thus delivering energy to the outer circuit.

The movement of ions in these batteries enables the current to move out of the battery and provide functionality. The term "battery" was originally specifically aimed at devices consisting of several cells, but the use of the term has evolved to refer to devices consisting of single cells as well. The primary battery is designed for use until exhausted and then discharged. Existing chemical reactions are usually not reversible and therefore cannot be recharged. When the battery runs out of reaction, it stops producing current and is no longer useful.

Secondary batteries can be recharged by reversing the cell's chemical reaction by electric current. This current generates a chemical reaction that can be used, recharged, and reused several times. The battery has two cells, wet cell and a dry cell. Wet cells are batteries that contain electrolytes in liquid form. Dry cells use an electrolyte paste with sufficient moisture to allow the flow to flow. This type of cell can function when installed in any orientation without spilling the contents of the cell compared to wet cells, as it contains free fluid, making this cell suitable for use in mobile devices.

Rated capacity: 7Ah.
Nominal voltage: 12 V
Cells per unit: 6
Design life span: 5 years
Weight: 2.05 kg

Figure 3.19 12VCD Battery

n) Flat Bar

Flat bar is a flat, rectangular section with edges varying in sizes. Used widely in general fabrication and repairs in general maintenance, agricultural implements and transportation equipment. It is easy to weld, cut, form and machine and is frequently use in framework, braces, supports, plates and straps.

In Lift Seat we use to build the crisscross like scissor lift. A scissor lift is a type of platform that can usually only move vertically. The mechanism to achieve this is the use linked, folding supports in a crisscross 'X' pattern, known as a pantograph (or scissor mechanism).

Figure 3.20 Flat Bar

o) Bearing

Bearing are one of the most commonly used machine components because their rolling motion makes almost all movements easier while reducing friction. 2 key function:

i. Transfer motion – they support and guide components which turn relative to one another

ii. Transmit forces

Components in bearing.

Bearing typically consist of the following components:

i. Two rings, inner and outer with raceways

ii. Rolling elements – rollers or balls

iii. A cage which keeps the rolling elements speared and helps guide motion

Type of bearing:

a. Ball bearing
   - Deep - groove ball bearings
   - Self - aligning ball bearings
   - Angular - contact ball bearing
   - Thrust ball bearing

b. Roller bearing
   - Tapered roller bearing
   - Spherical roller bearing
   - Cylindrical roller bearing
   - Needle roller bearing

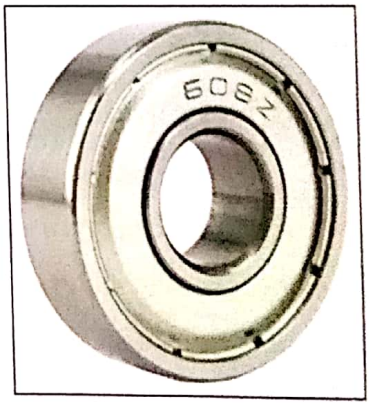

Figure 3.21 Bearing

p) Wheel

i. Light Duty Top Plate Grey Rubber Rigid Castor

Heavy duty casters are crafted with quality materials and meet a wide range of consumer needs. It is safe on carpet, concrete, tile and wood surfaces. This product use on desks, tv stands, carts, bed frames, dressers, chairs, tables, stools, toolboxes and more. The type of this wheel is made from rubber.

The size of Light Duty Top Plate Grey Rubber Rigid Castor is :

- Top mounting plate : 2.69" x 1.50"
- Bolt Pattern : 2.13" x 1.00"
- Bolt hole : 0.279"
- Overall height : 2.45"

ii. Light Duty Top Plate Grey Rubber Swivel c/w Side Brake Castor

This light-duty swivel caster is designed for maximum shock absorption to cushion you load and guarantee a smooth ride. Pressed steel double ball bearings ensure long service life. The light-duty swivel caster is designed to withstand continuous service. It is easy step-on locking brake like solid rubber tire with smooth face and zinc plated steel yoke and plate.

This castor brake/locking style are side brake. Material wheel is made from hard rubber while material rubber is made from steel. The set includes are 4 caster wheels, 2 wheel swivel and have side brake mechanisms and 2 wheels are fixed. Load rating of this castor 968 pounds total per set of 4 (242 pounds each). The heavy duty non-marking TPR rubber wheels.

The size of Light Duty Top Plate Grey Rubber Swivel c/w Side Brake Castor is :

- Wheel Size: 3-3/8"
- Plate Size: 3-3/4" x 2-1/2"
- Bolt Pattern: 3" x 1.75"
- Total height: approximately 4.7"

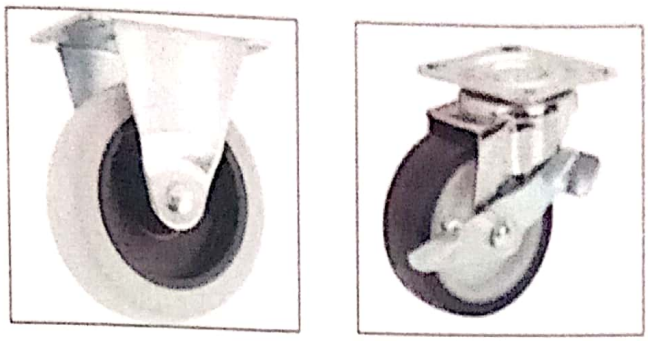

Figure 3.22 Images of the wheel we use

q) Spray silver 48

This product is made of the advanced petroleum manufacturing techniques. It is easy and gives an even fine spraying surface. The product possesses multiple strengths including weather resistant, hard, soft & durable, abrasion resistant, of strong adhesion and provides a long-lasting coloring. It should be widely used in spraying and repairing of surfaces of metal, wood, glass, leather, porcelain and many other kinds of materials.

r) Spray clear

A clear acrylic coating is a good spray to use to permanently protect artwork and give it a bright gloss finish. Test the spray on similar materials to see what the effect will be on the finished piece before you apply it. Clear enamel spray paint is a transparent finish that provides extra protection against rust, corrosion, tarnishing and chipping. This paint has non-yellowing formula to provide a crystal- clear look to suit your painting needs. Featuring a gloss finish, this paint ideal for use on metal, wood and concrete.

Figure 3.23 Spray silver 48

Figure 3.24 Spray clear

3.8 BUDGET

NO	MATERIAL	QUANTITY	PRICE (RM)	TOTAL (RM)
1	Mild Steel Hollow	2	30.00	60.00
2	Mild Steel Plate	1	113.00	113.00
3	Mild Steel Bolt & Nuts	26	5.00	130.00
4	Mild Steel Plate Bar	1	30.00	30.00
5	Actuator	1	303.00	303.00
6	Battery	1	60.00	60.00
7	Bearing	8	3.50	28.00
8	Paddle	1	12	12.00
9	Light Duty Top Plate Grey Rubber Rigid Castor	2	8.50	17.00
10	Light Duty Top Plate Grey Rubber Swivel c/w Side Brake Castor	2	6.00	12.00
11	Spray Sparkling 48	4	7.45	29.80
12	Spray Clean	1	7.70	7.70
13	Chair	1	40.00	40.00
				TOTAL = RM 842.50

Table 3.2 Cost estimation for material involved

3.9 MOVEMENT

Every product created must have the movement to function properly in order to function. In Lift Seat products, the material used to move it and function properly is actuator, scissor lift, bearing and battery.

3.9.1 Actuator

The main function of the actuator is to convert energy from hydraulic or fluid to mechanical energy or to produce the desired motion. The motion generated by this actuator is capable of moving in either linear or rotary conditions. Activity classifier based on the motion generated is:

I. Linear actuator suitable for hydraulic cylinder
II. Rotary actuator suitable for hydraulic motor
III. Hydraulic semi suitable for rotary actuator

Rotary actuator is an actuator that produces rotational or rotational energy. Actuator linear is used to produce energy for straight forward and backward or downward movement. The other call for a linear actuator is a ram, jack or stoker. However, this term applies to certain situations that have a specific meaning for a tool.

There are several types of actuators available such as Mechanical Actuators, Hydraulic Actuators, Pneumatic actuators, Piezoelectric Actuators, Twisted and Coiled Polymer (TCP) actuators, Elector-mechanical actuators and others that have similar functions but are applied according to the suitability of a project. Usually the actuator will be designed with a simple and simple design aimed at simplifying the installation process and saving space while installing and facilitating maintenance work.

Actuator is also a muscle of a robot that aims to move the robot's joints so that it functions and can perform a movement. It also requires sufficient power to accelerate and slow down the links as well as to lift the load. It is important to take into account the weight and ratio of loads

to be carried by the actuator as it has the limits and limitations to move a load.

The main purpose of the actuator used in the Lift Seat is to make it the main driving force for the seat lift to move downward as a result of the movement caused by the actuator. This Actuator is mounted on the back of the Lift Seat and is attached to the bottom of the Lift Seat and above the seat structure so that it can be mounted up and down.

It uses the battery power to move it and connects it using a positive and negative wire attached to the toggle switch and then mounted to the right of the seat so that it can be controlled and adjusted in height according to the comfort of the user at the desired height. The maximum height of this actuator is 30cm and it can handle up to 900N which weighs approximately 91kg.

The advantages of the lift seat can be listed as per below:

i. Actuator is a hydraulic replacement and its cost is much lower than that of a hydraulic system.
ii. Actuator can withstand 900N of weight and can go up to a maximum height of 30cm.
iii. Actuator can be exposed to any temperature and it is not corrosive as it is made of quality and safe material.

3.9.2 Scissor Lift

In theory, the scissor jack is commonly used in equipment moving from the bottom and from the left or in any direction specified by the designer. The main function of the scissor jack is to be a tool that helps to attach a load on its surface so that it does not move and is stronger to move from one place to another using specific concepts such as hydraulic, pneumatic, actuator and etc. according to product suitability.

These Scissor jacks are usually shaped like 'ziz-zac' and are coated with each other and are then combined using a tool according to the material used such as screws, nuts and so on. Since this scissor jack has a pair that moves parallel to the surface of the plate or product such as it is placed on the shaft and on the front or back with the aim that it will move in a balanced manner and can handle the load in parallel.

This end of the scissor jack is usually a bearing or tool that will help move the scissor jack so that there is less friction between the scissor jack and the path through which the scissor jack goes. Indirectly, the scissor jack moves smoothly and is easy to operate as it has a moving tool such as a wheel or bearing placed at the end of the scissor jack.

Further, this Scissor jack must use strong and hard steel to prevent any accident or accident arising from the failure of the steel scissor jack intended to accommodate the load placed on the surface. Among other reasons to use scissor lifts as a tool to assist with movement is because they are easy to operate or maintain in the event of any damage or anything that needs to be maintained.

The purpose of this scissor applied to the Lift Seat is to serve as a tool to support the human load that is on the Lift Seat during the up and down process. This scissor is made from flat bar due to its thin structure which allows it to save space and hence a strong and hard type of steel which is very suitable as a tool for the actuator.

The presence of this scissor indirectly makes the Lift Seat more balanced as it is positioned left and right under the seat. This scissor on

the Elevator Seat is only one pair and allows this scissor to only go to a height of 30cm equal to the maximum actuator height.

The advantages of the lift seat can be listed as per below:

i. Scissor can be expanded to a higher position and it can be narrowed to a smaller one and look neater when the movement occurs.
ii. Able to balance the Lift Seat so that it does not shake during a movement.
iii. Assist the Actuator in the process of moving the Lift Seat and provide assistance to support the weight of a human being mounted above the Lift Seat.

3.9.3 Bearing

It is a component that functions to reduce the friction applied to a machine or components that move or rotate or it presses against each other to perform a movement.

In general, it aims to reduce the boiling point that will cause the two surfaces to become heated, which in turn can be one of the factors for the wear and tear of one surface and thus the expense of repairing the machine. It is used for the purpose of suppressing or exerting a movement of components that produce movement. It is usually used on shafts where friction is most prevalent.

All moving Shafts need a bearing to control their movement and bear the load. The load on the shaft and gear that is located 90 degrees from the center line shaft is called the radial load. The movement of the shaft moving from left to right resulting in a rotation is called a thrust load.

The bearing will hold the radial load and thrust aim to keep the shaft rotating. Bearing is divided into two parts, Solid Bearing and Anti-Friction Bearing. Solid Bearing is when the shaft rotates above the bearing surface. Between the shafts and the bearing is a thin layer of lubricant that aims to facilitate movement. When it rotates, the shaft is controlled by the lubricant layer instead of bearing.

Anti-Friction Bearing is a product made of hard steel. Some of the main parts of this type of bearing are:

i. There is inner race (outer ring) and outer race (outer ring) intended for rolling elements.
ii. Ball, roller or needle are rotating elements intended to reduce friction.
iii. Separators or cages are regulators of distances between rolling elements.

Bearing is used to move the scissor jack on the seat lift so that every up and down movement is smooth and not stuck. The amount of bearing used on the Seat Lift is 8 bearing and each end of the scissor is placed in two bearing bearings for smoother movement. Between the two ends of the scissor at the rear position is turned off by not placing a bearing on the scissor and replaced with screws attached to the soldered iron so that it does not move during the scissor movement.

The advantages of the lift seat can be listed as per below:

i. The main advantage of bearing is that it launches scissor movement on the Seat Lift in each position.
ii. Bearing is like a tire and it can rotate 360 degrees without any obstruction.
iii. It is also a replacement for liquid lubricant or grease which can have a dirty and oily effect on the Lift Seat.

3.9.4 Battery

Battery is an external electrochemical cell installed and supplied to electrical devices such as flashlights, smartphones, and remote control and so on. Batteries that supply electricity generally, the positive terminal will act as a cathode while the negative terminal will act as anode. The function of the anode is to drain energy from the electron source and transmit it to the external device to which it is connected. The term

"battery" originally referred to a device consisting of several cells but has evolved, and the term has evolved to refer to a device consisting of a single cell.

It is classified into two types, primary and secondary. The primer is designed for use until exhausted and subsequently removed and cannot be recharged or recharged. While the secondary type of battery is capable of being recharged by reversing the chemical reaction of the cell by the electric current itself. This current can generate reusable and rechargeable chemicals for several times depending on the durability of the battery.

Type of cell also affects every battery available. There are two types of cells that exist: wet cells as well as dry cells. Wet cell batteries are batteries that contain electrolytes in liquid form. A dry cell type battery is a battery that uses an electrolyte paste with sufficient moisture to allow the current to flow to generate energy. This type of cell also works when paired where no orientation is concerned with the contents of the cell being spilled compared to wet cells containing free fluids that can be spilled if mistakenly handled.

The size of regardless, the Primary Battery available for use is from a small button cell used for electrical up-to-date NO 6 cells used for signal circuits or long-term maintenance. While secondary cells are produced in a very large size that can move a submarine or stabilize the electric grid which helps level out the peak load level.

The important chemical properties of a battery are such as voltage, energy density, combustion, standby and cell, operating temperature and shelf life are determined by the chemical content of the battery itself.

Battery is commonly used to act as a power supply to an electrical component. So, the battery used on this Lift Seat is intended to provide the Actuator with enough power to move it from one level to another. These batteries are located at the bottom of the Lift Seat between the site and the scissor and are furthermore included with safety features such as

adding an iron barrier to the battery so that it is not easily picked up and taken by irresponsible people.

The Actuator's wire is fitted with new wires designed and mounted once with a toggle switch to allow it to be controlled by the user if the wires are attached to the battery. The battery used on the Lift Switch is a 12 VCD type battery used on motorcycles and is readily available in any shop that sells spare parts in case of battery drain.

The advantages can be listed as per below:

i. Battery is a dry cell that is easy to maintain and easy to obtain new batteries in the event of a battery drain or damage.
ii. Batteries are more agronomic because they can be carried anywhere compared to using electricity that can only be used when connected to a plug that has electricity.
iii. Beautiful and neat battery shape to be placed at the bottom of the Lift Seat without adding any jewelry to make it look neat.

3.9.5 Assembly

3.9.5.1 Welding

There are four types of welding;

a) Shielded Metal Arc Welding (SMAW)

With this particular type of welding, the welder follows a manual process of stick welding. The stick uses an electric current to form an electric arc between the stick and the metals to be joined. This type is often used in the construction of steel structures and in industrial fabrication to weld iron and steel.

b) Gas Metal Arc Welding (GMAW/MIG)

This style of welding is also referred to as Metal Inert Gas (MIG). It uses a shielding gas along the wire electrode, which heats up the two metals to be joined. This method requires a constant voltage and direct-current

power source, and is the most common industrial welding process. It has four primary methods of metal transfer: globular, short-circuiting, spray and pulsed-spray.

c) Flux Cored Arc Welding (FCAW)

This was developed as an alternative to shield welding. The semi-automatic are weld is often used in construction projects, thanks to its high welding speed and portability.

d) Gas Tungsten Arc Gas Welding (GTAW/TIG)

Welding together thick sections of sections of stainless steel or non-ferrous metals is the most common use for this method. It is also an arc-welding process that uses a tungsten electrode to produce the weld. This process is much more time consuming than the other three and much more complex too. The weld we use is a type of GMAW/MIG. This type of welding have advantages and limitations.

The advantages of the welding can be listed as below:

a. Low hydrogen deposits

Since solid does not pick up moisture like flux-cored wires and stick electrodes it consistently deposits welds with low levels of diffusible hydrogen. You can learn more about why this is important by reading ''WHY WELDS CRACK''

b. Can weld almost all metals

By simple changing your filler wire and at times the shielding gas you can weld form carbon steel, to stainless steel, to nickel alloys and aluminum.

c. Low levels of spatter

Low spatter can achieved by selecting the right mode of metal transfer. Spray and pulse welding can provide this benefit.

d. Unlimited thickness

This process allows for welding light gage material and up to unlimited thickness by using multiple passes. Higher amperages and proper joint configuration are needed to weld.

e. Easy to learn

Unlike TIG welding or stick welding, MIG welding is easy to learn.

f. Little clean up

Since MIG welding is a slagless process it does not require chipping slag, cleaning up flux or discarding unused stick stubs.

The limitations of the welding can be listed as below;

a. Sensitive to contaminants

The process can only handle low to moderate levels of surface contaminants such as rust, mill scale, dirt, oil and paint. All these have potential to create problems such as porosity, incomplete fusion, bad bead appearance and even cracking.

b. Portability

Moving the welding equipment may not be that tough, but you also have to handle the high pressure cylinders that contain the shielding gas. Proper care must be taken.

c. Sensitive to wind

The shielding gas used for MIG welding can easily be blown away when welding outdoors. Even inside, a fan or a wind draft of as low as 5mph can be enough to cause porosity.

d. Lack of fusion

Due to the ability to weld at low currents this process has the potential for lack fusion when running in short circuit mode. Make sure you always use the correct procedure for the thickness of material you are welding. There is a reason why

the American Welding Society does not have pre-qualified procedures using the short-circuit mode of metal transfer.

e. Open arc process.

As with most welding process, GMAW exhibits an open arc. Proper care must be taking to shield the welder and bystanders from the harmful UV rays.

3.9.6 Wiring

In this project we use some of wiring that function to move up and down 'Lift Seat. A few of things that we using is a toggle switch, port battery and so on. The function of wiring in this project are to improve our innovation Lift Seat and making it easier for users to use it. If don't have wiring in this project, then there is no innovation our project.

a. Toggle Switch

A toggle switch that we use in Lift Seat are use for move up and down the Lift Seat. Right switch is use move up while left switch is move down. We use a toggle switch because it easy to users to use and toggle switch is common switch always use in daily. Moreover, a toggle switch also easy to find and buy.

A toggle switch or tumbler switch is a class of electrical switches that are manually actuated by a mechanical lever, handle, or rocking mechanism by a moving a lever back and forth to open or close an electrical circuit. Toggle switches are available in many different styles and sizes, and are used in numerous applications. Many are designed to provide the simultaneous actuation of multiple sets of electrical contacts or the control of large amounts of electric current or mains voltages.

A switch where a definitive click is heard, is called a " positive on-off switch". A very common use of this type of switch is to switch

lights or other electrical equipment on or off. 1 ways toggle switch rated 20A@12V with metal plate ON/OFF decal.

The specification of toggle switch is :

- Switch position three (on-off-on)
- Pole/way : 2 pole/1 way
- Rating : 20A@12V
- Lever type : Metal
- Terminals : Screw
- Panel hole size : 12.5 mm
- Overall dims (inc. terminals) : 25 (W) x 34 (H) x 53 (D) mm

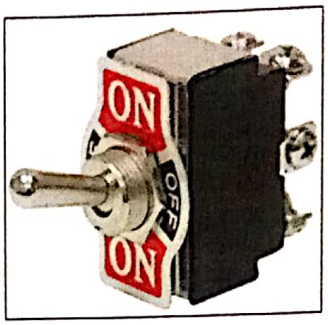

Figure 3.25 Toggle switch

b. Port battery

A port battery are connecting device between the wire and the battery. It connects the wire to the battery because to move the Lift Seat up and down. If a port battery didn't have, Lift Seat can't function properly.

Figure 3.26 Port battery

c. Network wrap cable

Wire wrapping was used for splices and for finishing cable ends in suspension bridge wires and other wire rope rigging, usually with a smaller diameter wire wrapped around a larger wire or bundle of wires. Such techniques were purely mechanical, to add strength or prevent fraying.

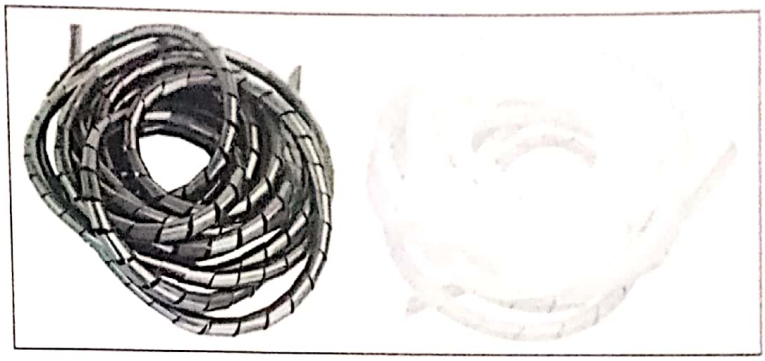

Figure 3.27 Network wrap cable

3.9.7 Joint

A scissor lift relies upon the elongation of a collapsible mechanism to provide vertical elevation in ratio to a rotational or linear input. These devices are widely utilized and are capable of lifting significant loads safely and efficiently.

i. How the scissor lift operates

Scissor lifts owe their mechanical capability to the pantograph. A pantograph is a series of linked parallelograms with hinged intersections that allow the operator to elongate the mechanism while maintaining the integrity of the geometric figure.

The structural components of the pantograph serve as opposing line segments within adjacent parallelograms; geometric changes are therefore uniform across the mechanism. True vertical lift is accomplished by using components of equal length.

As L (the length of the base) increases, the pantograph contracts, and X° deceases while Y° increases. As L decreases, the pantograph extends, and X° increases in contrast to Y°.

When two pantographs are arranged so as to actuate from a single drive they extend correspondingly and loads can be balanced between them. A calculator exists for computing the linear input force required according to where the drive supplies power to the scissor mechanism, be it upon the base or a center pin (as depicted in figure 20 and 21).

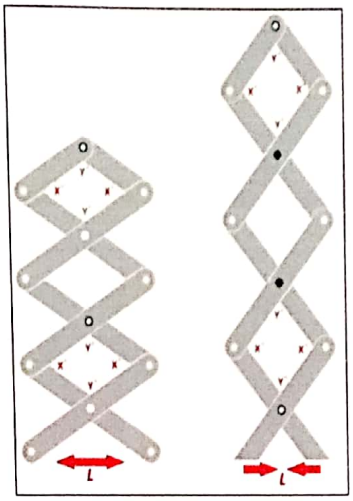

Figure 3.28 'X' Scissor lift

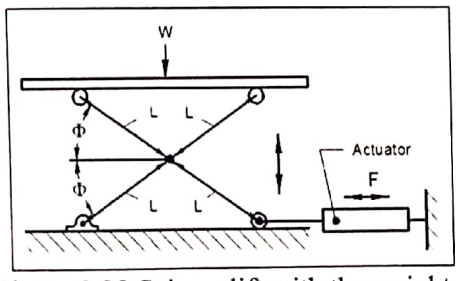

Figure 3.29 Scissor lift with the weight

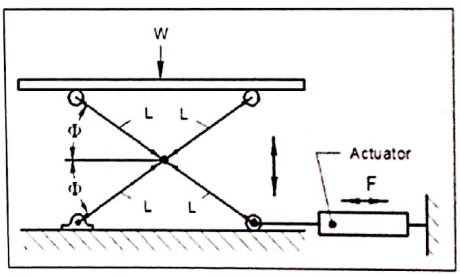

Figure 3.30 Scissor lift

Scissor lifts require linear motion to supply elevation and this force is provided by a pneumatic or hydraulic actuator, or a mechanical input such as a leadscrew or rack and pinion drive.

Scissor lifts require linear motion to supply elevation and this force is provided by a pneumatic or hydraulic actuator, or a mechanical input such as a leadscrew or rack and pinion drive.

ii. Power Supply

Stationary scissor lifts are almost always fed by an AC electrical supply. They typically utilize 12V batteries that are stored in a maintenance panel along with a recharging cord that connects to AC power supplies. This scissor lifts are making their preferred workspace indoors. However, load capacities and work platforms are smaller than gas engine brethren.

iii. Tips for Scissor Lift Safety

a) Perform routine maintenance
b) Focus on positioning
c) Ensure the scissor lift is stable
d) Get serious about fall protection
e) Train the employees to ensure scissor lift safety

iv. Common Scissor Lift problems

Most problems that occur when using a scissor lift are due to misuse or improper set up. Working at height can be dangerous, and the safety regulations and guidelines are there to keep operators safe, and ensure that access machinery is used correctly.

Scissor lifts are used in various different applications and industries, for repair and maintenance, access, installation, construction, events and transportation. Here are just a few of the types of issues may encounter when using a scissor lift, and how to avoid them:

a) Overturning or Tipping

Tipping and overturning your scissor lift should not be an issue if it has been correctly set up on suitable ground conditions. Carrying out a thorough ground assessment is essential for safe use of an aerial work platform, to ensure that the ground is strong enough for the weight of the access machine.

Make sure the scissor lift's wheel and components are not worn or damaged, as these can also affect stability – regular maintenance can keep your powered access machinery working safely.

b) Excessive Load Capacity

A scissor lift's motor, supports or balance can be affected when its load capacity is exceeded. Make sure that the load, including operators and tools, does not exceed the capacity outlines in user manual.

c) Inappropriate Use

Scissor lift accidents most often occur when the lift is used in an inappropriate way. This might include using an indoor lift outdoors or vice versa, or using the platform for a use it was not designed for.

d) Poor Condition

Keeping your scissor lift in good working order is essential – never use a work platform that is faulty or damaged.

CHAPTER 4
MANUFACTURING PROCESS

4.0 INTRODUCTION

The manufacturing process is an introductory process that deals with tools, materials, methods of conduct, measures, and safety regulations that must be followed in great detail. In order to properly plan and execute a project, some aspects and methods or procedures need to be known and understood in advance.

Therefore, the aspects and methods for implementing a project are knowing the equipment and materials used during the project. It also makes it easier for students to recognize and understand each and every use of the equipment and components.

Therefore, the necessary aspects and methods for carrying out a project are to know the equipment and components used during the project. This is to make it easier for students to identify and understand each and every use of the equipment and components. In order to produce high quality and quality products, the manufacturing process must be done in stages so that the results obtained can be satisfactory and in accordance with the specifications set according to the plan.

Therefore, an initial scheduling schedule has been prepared so that project completion can be completed within a specified time. The design and development outlined in the approach are widely used. Indirectly, this method is used as a design guide to ensure the project is completed successfully.

Beginning with identifying problems and justifying the scope, the project identifies the problem of 'lift seats' until the machining process. Scope the project is necessary to ensure that the key objectives of the project are met. To begin the process of product development, a model search is performed to find the right method for design, at the same time, customer needs are identified by conducting in-market research. From this stage the product targets meetup to provide machine design needs based on customer needs.

4.1 WEEKLY REPORT

i. First Week

The student meeting with the supervising lecturer was held for the first time. Classroom divisions and descriptions of project types and introductions to several supervising lecturers. These include:

i. Mrs. Nazratulhuda bt Awang @ Hashim
ii. Mrs. Ani bt Yaakob
iii. Mrs. Nurus Sadikin bt Abdul Razak Khan
iv. Mrs. Hafizah bt Hashim

Students should then choose each member of their group willingly given their own choice. Subsequently, the supervisor will make a random draw to select the student.

ii. Second week

This week we met with a selected supervisor, Mrs. Nazratulhuda bt Awang@Hashim to discuss the project titles and projects we would like to work on. Each student will need to present at least 5 different types of titles regarding our final project. here is our project proposal:

i. Heat pen
ii. Washing machines multifunction
iii. 21st century chair referee chair
iv. Inhaler for depressing cans
v. Lift Seat

iii. Third week

We talk about the selection of titles and projects we will be able to work on until we get the project we decide on. After getting approval from our supervisor on the project title called 'Lift Seat'. We discuss how to

complete the project as well as calculate the cost of each to purchase items such as steel, bearing, actuator, battery, wire, spray and so on.

iv. Fourth week

This week we shared the task with members of the group Mustaqim b Hud, Nur Nabilah huda bt Le and Nur Athirah b Azmi Murad. The sharing of these tasks is important to speed up the manufacturing process. We're looking the metal from suppliers. After that, we made a joint proposal with the project we were working on.

v. Fifth week

This week after our proposal was approved by the supervisor, we have started to create a 'chart of the project'. We have started with a rough outline of the project we have set. Before starting a cutting and welding job, this sketch is necessary because the size is so important that no mistakes are made while doing work in the workshop.

vi. Sixth week

This week our group is doing a work of cutting metal that has been measured according to the set size. Cut metal size is 15 inch (wide) x 16 inch (height) that approximately the standard size of a chair.

Figure 4.1 Metal frame

vii. Seventh week

We assemble the base frame of the 'Lift Seat' back and forth by welding or connecting. Before we weld, we will smooth the surface of the metal using a grinder machine for a smooth connection. The up and down sides are connected.

Figure 4.2 Images of complete metal frame Lift Seat

viii. Eighth week

This week, we continue our work. We did an metal cutting job called a flat bar to make a cross using the concept of scissor lift. The flat bar is made up of 3 holes, which are middle, left and right to move it. The holes that are 6 cm in diameter. The hole is made for bearing.

Figure 4.3 'X' scissor lift

ix. Ninth week

Upon completion of the scissor lift installation last week, the scissor lift installation process was installed between the 2 basic frames, the base frame and back 'Lift Seat'. The bearing scissor lift was initially in good condition, having been mounted to the base frame, the bearings ran in and out of place. We think and recommend that 90 degree angle iron beams be placed to block the movement of the bearing. Bearing is placed with a sprocket to facilitate movement.

Figure 4.4 Base and back frames with 'X' scissor lift

x. Tenth week

This week, we did the measurement and cutting of steel and welding to place the actuator behind the chairs and batteries. The actuator position is as vertical as the back of the 'Lift Seat' while the battery position is located next to the actuator. There was no problem during installation.

Figure 4.5 Lift Seat

xi. Eleventh week

We're hoping to make it easier for users to use 'Lift Seat' by adding a hand grip to the back. Once done, the supervisor told us that the handles behind the chair were inappropriate because they were too big and told us to throw them away. We agreed to put the motor paddle in the back seat. We also put wheels in place to facilitate 'Lift Seat' movement.

Figure 4.6 Actuator

xii. Twelfth week

This week we made the wiring on the elevator seat. Wiring connecting the actuator, battery and switch to synchronize the lift seat up and down. When ready to connect, we try to raise and lower by asking someone to sit in the chair while pressing the switch and suddenly there is no movement up and down due to a broken switch. therefore, we are looking for a new switch.

xiii. Thirteenth week

This week, we did a 'finishing' process, which is to smooth out the metal surfaces of the welding and spray lift seats. The 'lift seat' spray is designed to appeal to users.

xiv. Fourteenth week

Once all the processes are ready, we carry out the final testing process to determine whether the actuator can go up and down as well as the wheels that can move vertically and horizontally.

4.2 INSTALLATION PROCESS

Provides equipment to be used during the installation and cutting process so that work can be done quickly. Then make sure each size is created based on the project sketch created so that it does not suffer from size defects during the cutting process.

To know each of the parts that need to be connected in the right position and angle in order to facilitate project work. For the purpose of incorporating components and parts in our overall steel project and we are gearing up to make it a solid frame, there are components such as bearing required for a neatly integrated process, screws used to attach parts to a 'scissor lift' that requires repairs to be upgraded and lowered well.

The installation process is a very complicated process and requires detailed research. The wiring process also needs to be done to get our project working together in collaboration between groups as it is important as it helps to save time and can simplify the work and production of this product.

4.3 DESIGN PROBLEM

The objectives of this phase are to test the product function, state the product problem, solve the problem and try to modify the product as needed to solve the problem. Some tests need to be performed on this product for the purpose of ensuring that it works properly and does not cause any problems. We have listed some of the tests we have run including:

a) The actuator test, the actuator movement up and down that we did. In addition, the actuator wire connection to the battery we tested by attempting to increase and decrease the actuator with the wire connection.

b) Scissor lift stability test is crucial to our product development, this test is intended to test ' Lift Seat ' which uses the concept of scissor lift to stand up properly. The test of ' Lift Seat' stability is to raise and lower 'Lift Seat ' in order to move well.

The results of this test will determine whether the system we want to implement on our panel is effective or not. As a result of the tests we have, the tests are positive and negative. The negative is that we try to find where the problem is and we try our best to solve it. If you have problems finding a dead end, we will customize this project to make it easier for users.

4.4 PROJECT EARNINGS PROCESS

Project creation should be carried out according to schedule. Selection of materials used, cutting process, wiring process and installation process is a steel connection that needs to be done by ensuring the size and accuracy as planned in the table.

a) Selection of desired material.
b) The process of cutting the workpiece according to the specified size.
c) Installation and connection process (welding)
d) Wiring process of actuator wires and batteries.

CHAPTER 5

RESULTS AND DISCUSSIONS

5.0 RESULT ANALYSIS

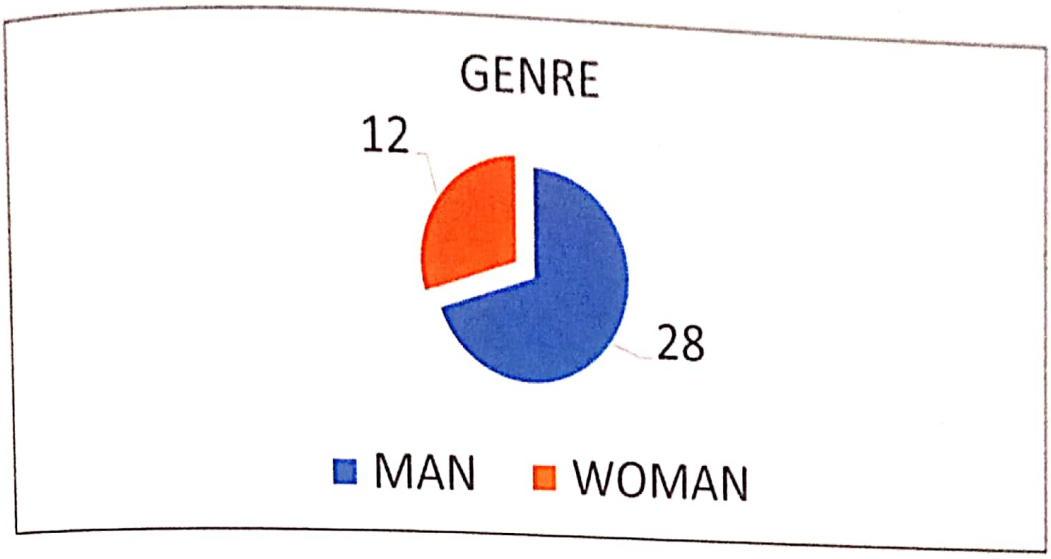

Figure 5.1 shows pie chart, it is a pie chart on the number of responses in men and women. Number of female responders more compared to males.

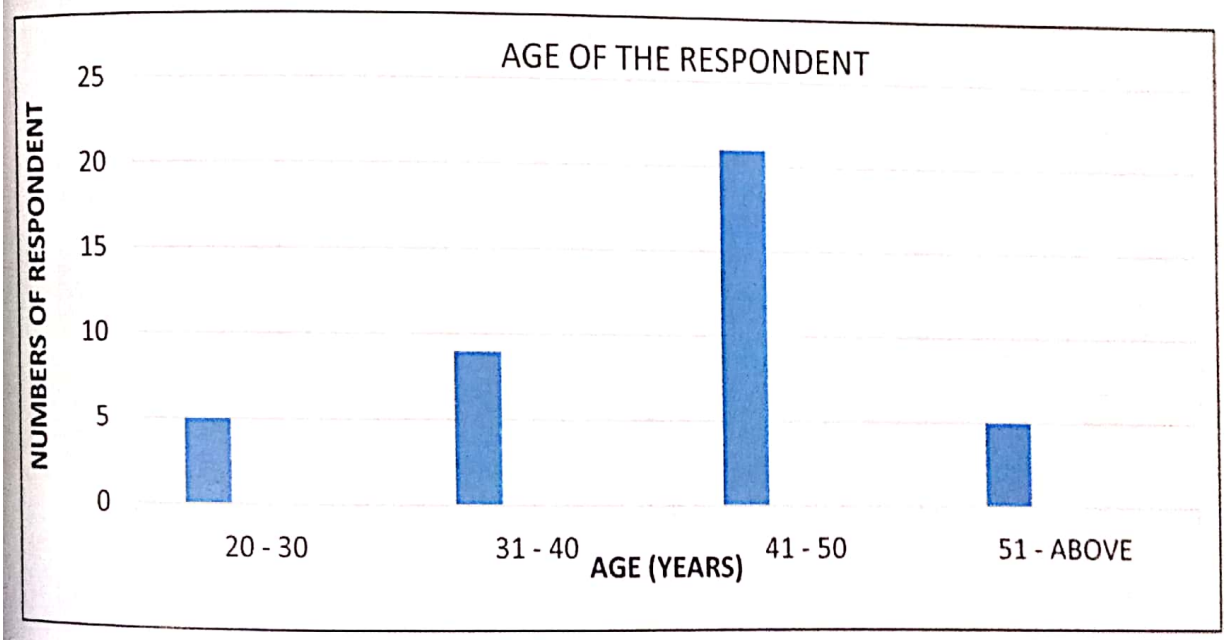

Figure 5.2 Age of the respondent

The pie chart shown above is a pie chart showing the age of responding. The age range of 41-50 is highest compared to the number of ages 31-40. The level of achievement shown is satisfactory as it achieves our goals.

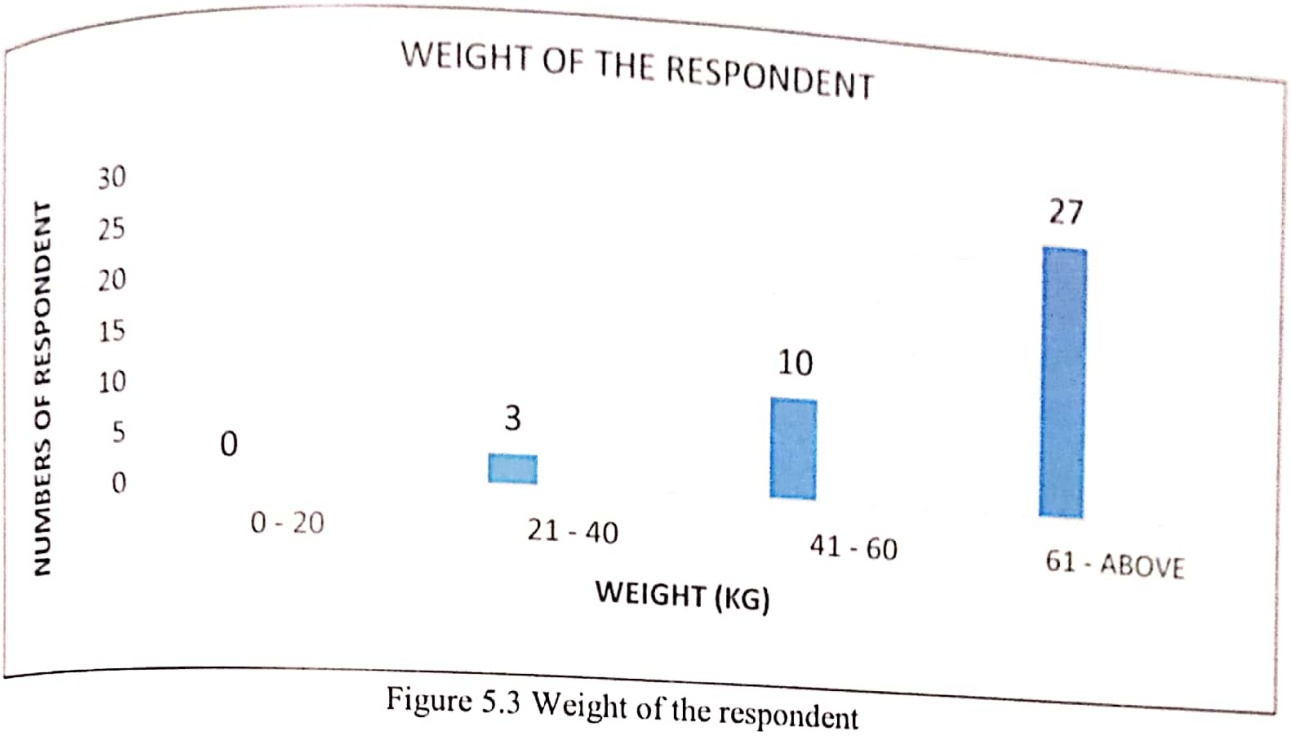

Figure 5.3 Weight of the respondent

Based on the pie chart above it shows the weight of the respondents that have been surveyed. The number of responses is 27 responses is higher than others. The second highest 41-60 kg weighs 10 responded.

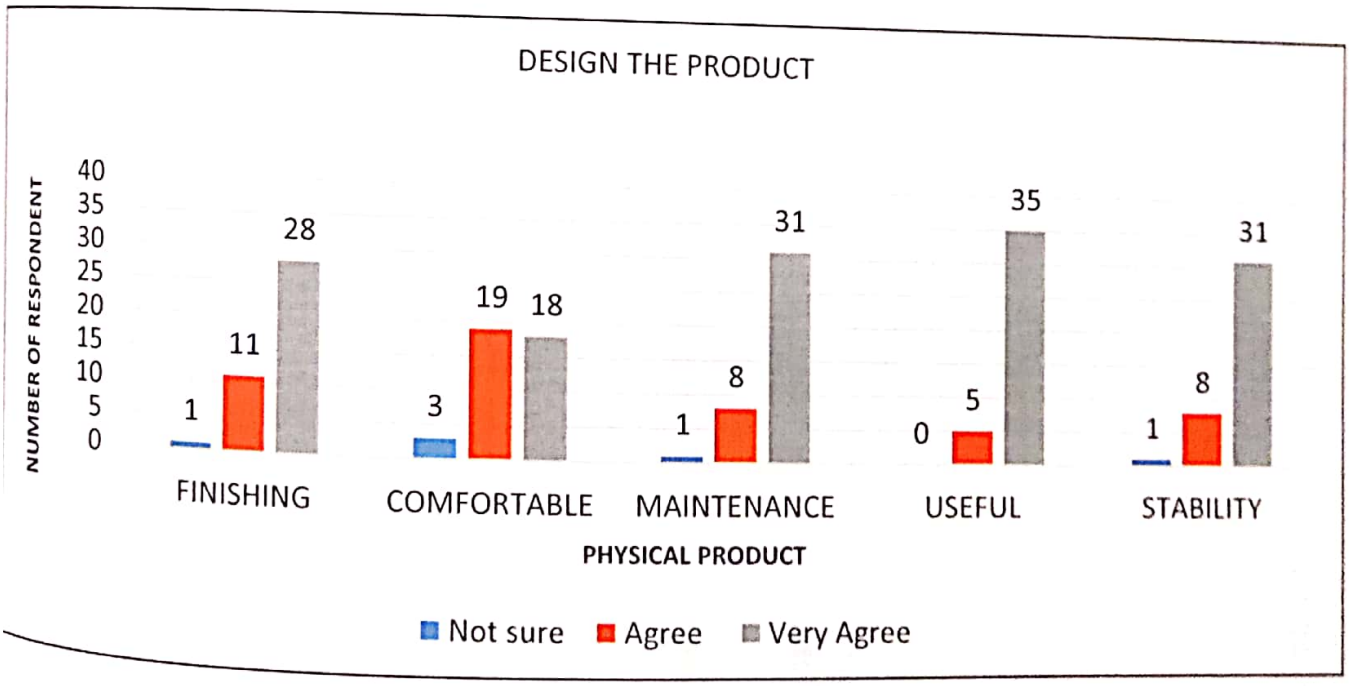

Figure 5.4 Design the product

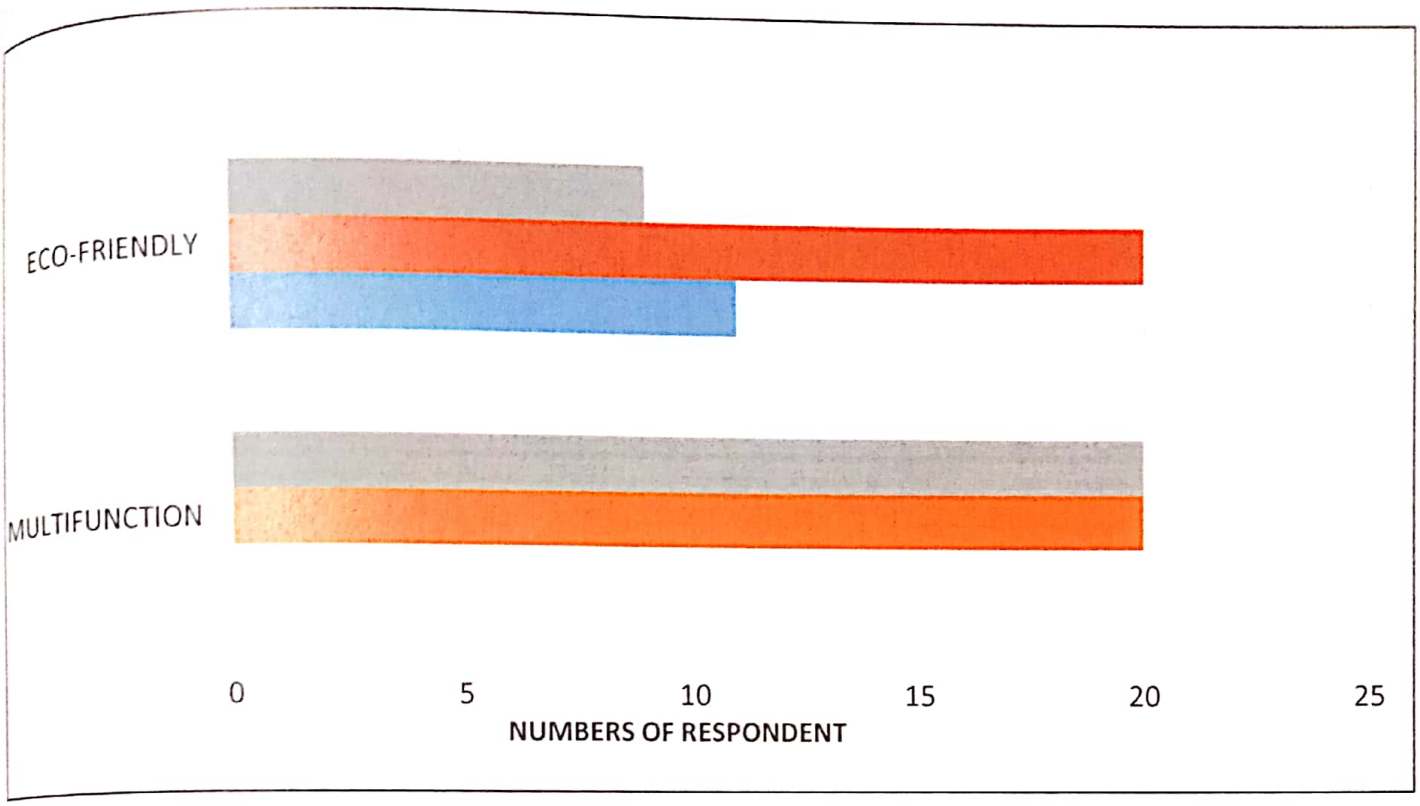

Figure 5.5 Number of respondent

The chart in Figure 5.5 shown above is about the advantages of eco-friendly Lift Seat and multifunction. The level of achievement shown is meeting our target. It has a positive impact on the response.

Based on the observations of each group member, we recommend some improvements to this Lift Seat. Among the improvements is:

i. Hollow Steel

We use hollow steel as it is a stainless steel and lightweight. This material is used on the seat surface to strengthen and balance this Lift Seat. They are also heat-resistant, non-corrosive and can be used for a long time. Therefore, we use this type of steel to strengthen this Lift Seat. In general, we use 100% hollow steel for the basement structure and also for the scissor lift.

ii. Plastic Chair

We use "kerusi kuliah" as seating because it is so easy to find at anywhere for example in Ikea. In addition, these chairs are often found in mosque areas. The election of "kerusi kuliah" because of its curved structure at the back makes it comfortable to sit on.

iii. Motorcycle Paddle

The use of the Ex5 motorcycle`s paddle is intended to serve as a handle to facilitate "Lift Seat". Also, this paddles are used because it is easy to find in motorcycle shops, hardware and etc. This ex5 motorcycle's paddle was chosen because it was safe to use. this is because it has used harmless rubber and easy to fold for storage.

iv. Rechargeable Battery

Choosing this rechargeable battery can save the money as it can be recharged if it runs out of battery. These batteries are easy to find in workshops. In addition, these rechargeable batteries can be submitted for recycling according to local environmental regulations for waste disposal. Therefore, the rechargeable use of these batteries can save the environment from pollution.

5.1 SUGGESTION

The following are some suggestions and additional ideas related for this "Lift Seat".

- Use the silencer for reduce the action of the actuator.
- The movement of the Lift Seat move to left and right.
- Change the toggle switch to button.

5.2 SUMMARY

Each project developed has its own advantages and disadvantages, as well as this "Lift Seat" project. In order to fully automate this process there are a number of problems that we face in relation to this "Lift Seat". However, no problem cannot be resolved. We work together with our team members and helped from our supervisor, Mrs. Nazratulhuda binti Awang @ Hashim to resolve the problem.

CHAPTER 6

CONCLUSION AND RECOMMENDATION

In making this Lift Seat, we had to come to a conclusion as a group before implement it. We need to meet and discuss with our supervisor, Mrs. Nazratulhuda binti Awang @ Hashim about our progress of the project for every week. This action taken to make sure that we can get relevant advises and information needed to improve our project, Lift Seat. This Lift Seat is simple but it is also having their own problems and difficulties when implementing it.

So, for this part we will explain about the problems that we faced and their solutions to handle it. Recommendations for future research and work are also outlined. The recommendations can be summarized as improvements to the design, material used or working principles.

APPENDIX

Figure 6.1 Groupmates

Figure 6.2 Groupmates with supervisor ZULLDESIGN

Figure 6.3 Groupmates with supervisor at ZULLDESIGN

Figure 6.4 Groupmates with supervisor

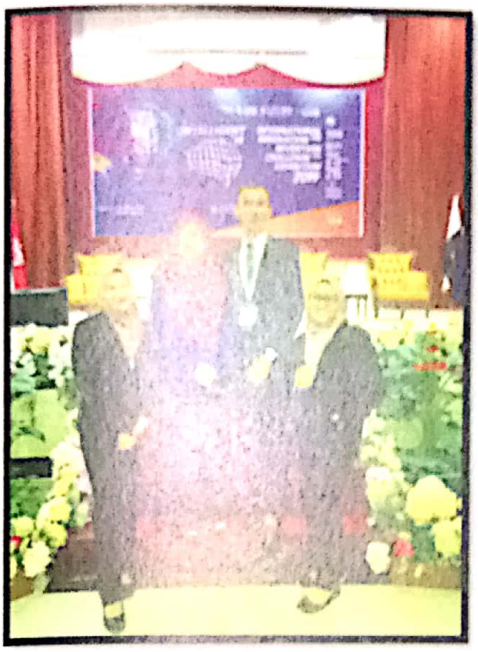

Figure 6.5 International Innovation and Invention Challenge via Exhibition 2019

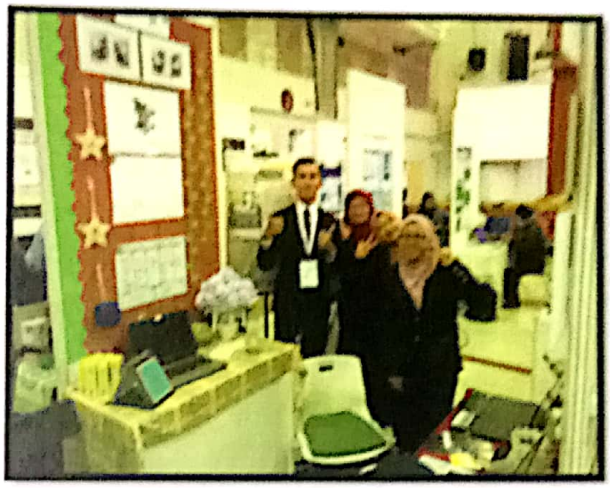

Figure 6.6 International Innovation and Invention Challenge via Exhibition 2019

Figure 6.7 PITEX

Figure 6.8 PITEX