POLITEKNIK SULTAN SALAHUDDIN ABDUL AZIZ SHAH

PRINTING MACHINE

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JABATAN KEJURUTERAAN MEKANIKAL

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

JABATAN KEJURUTERAAN MEKANIKAL

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AKUAN KEASLIAN DAN HAK MILIK

TAJUK : PRINTING MACHINE

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Adalah pelajar tahun akhir **Diploma Kejuruteraan Mekanikal, Jabatan Kejuruteraan Mekanikal, Politeknik Sultan Salahuddin Abdul Aziz Shah**, yang beralamat di **Persiaran Usahawan, 40150, Shah Alam, Selangor**. (selepas ini dirujuk sebagai 'Politeknik tersebut').

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

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

Diperbuat dan dengan sebenar-benarnya diakui

Oleh yang tersebut;

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ABSTRACT

Printing is a process of reproduction of text and images commonly done using print machines that exert ink on objects. With regrets, many people out there do not take a story about the importance of printer machines. Most of the printer machines out there have been large sizes. This makes the printer machine hard to carry. The objective of this project is the design and development of prototype a user-friendly printing machine and easy to carry. In addition, our objective is to assist the new people in the printing world. This is to reduce the cost that you want to get started. The use of the machine without connecting to plug is the improvement of this printer machine. This printing will not require many energy extraction.

Keywords: *Printing Machine*

ABSTRAK

Pencetakan merupakan proses penghasilan semula teks dan imej yang lazimnya dilakukan dengan menggunakan mesin cetak yang mengenakan dakwat keatas objek.Dengan dukacitanya,ramai masyarakat di luar sana tidak mengambil kisah tentang kepentingan mesin pencetak.Kebanyakkan mesin pencetak di luar sana menpunyai saiz yang besar. Ini membuatkan mesin pencetak susah dibawa dimana-mana.Objektif projek ini adalah rekabentuk dan membangunkan protaip sebuah mesin pencetakan yang mesra pengguna dan mudah dibawa dimana-mana.Selain itu,objektif kami untuk membantu golongan yang baru menjinak dalam dunia pencetakan.Hal ini untuk mengurangkan kos yang golangan yang ingin bermula. Penggunaan mesin tanpa menyambungkan pada plug merupakan penambahbaikan mesin pencetak ini . Mesin pencetak ini tidak memerlukan perahan tenaga yang banyak.

Kata Kunci: *Mesin Pencetak*

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CHAPTER 1

INTRODUCTION

1.1 **RESEARCH BACKGROUND**

Screen printing is a printing technique whereby a mesh is used to transfer ink onto a substrate, except in areas made impermeable to the ink by a blocking stencil. A blade or squeegee is moved across the screen to fill the open mesh apertures with ink, and a reverse stroke then causes the screen to touch the substrate momentarily along a line of contact. This causes the ink to wet the substrate and be pulled out of the mesh apertures as the screen springs back after the blade has passed.

Screen printing is also a stencil method of print making in which a design is imposed on a screen of polyester or other fine mesh, with blank areas coated with an impermeable substance. Ink is forced into the mesh openings by the fill blade or squeegee and by wetting the substrate, transferred onto the printing surface during the squeegee stroke. As the screen is removed from the substrate, the ink remains on the fabric making beautiful patterns. Screen printing is also known as serigraphy or serigraph printing. One colour is printed at a time, so several screens can be used to produce a multicoloured image or design. (Wikipedia)

Adu-Akwaboa (1989) defines screen printing as a process of transferring a good paper design onto a fabric.According to him, this is achieved by transferring the design onto a tracing paper (kodatrace) with opaque ink. Each colour on the design must have a separate tracing paper. In other words, each colour will have a separate screen for printing. A photographic method is used to transfer the design from the tracing paper to the screen with the help of light. During the photographic development of the screen, the opaque areas are left open for dye penetration while the negative areas are blocked to avoid dye penetration.

Tortora and Merkel (2005), explain the process of screen printing as a method of printing whereby the patterns are blocked out on a mesh fabric or screen so that when the colour is squeezed through, it will penetrate the unblocked areas. The colour paste is forced through the screen by a squeegee. Each colour in the pattern requires a separate screen.

Screens can be used to print beautiful designs on any smooth and absorbent material be it fabric, ceramic wares, paper, sacks, bags and t-shirts. The screens which are normally made of soft wood and mesh come in various sizes depending on the size of the design to be created and the surface area to be covered. Shirts and bag printing has become the preoccupation of most local printers because of its high demand and accessibility. Social groupings such as school leavers, community associations and public institutions put on shirts or bags as a way of identification and socialization.

Despite the easy accessibility of tools and materials for shirts or bags printing, the processes involved in the printing are tedious. Two people are normally involved in the printing. One person holds the screen while the other pulls the squeegee to print the design. After printing, the squeegee is held in the hand for the next printing session but if care is not taken, the printing ink can soil the hands which can easily be transferred onto the t-shirt thereby making it dirty. In the event where there is no person to assist the printer, printing becomes difficult and this can result in defects.

To mitigate the problems associated with shirt or bag printing, the " Printing Machine" has been designed. It comes with a metallic frame which holds the screen, a detachable padded printing table and a free-moving and adjustable squeegee. The "Printing Machine has the capacity to print a large number of t-shirts due to its fastness. It is portable and can be easily carried along and printed anywhere. The machine is convenient to print by one person. Thus, there is no need for a second person. The machine is therefore economical and less stressful. **Figure 1.1** shown a example of printing machine.

Figure 1.1 : *Example of printing machine*

1.2 PROBLEM STATEMENT

A printing machine is a machine used to print clothes and bags. These machines are commonly used in special places and factories for printing. Nowadays, this printing machine should be a necessity for every small business in order to reduce the energy and time to go to the factory to do the printing.In addition,they can save their energy and time by having this printing machine.At the same time,we must have high-tech machines such as this printing machine where we have emulated the sophistication of technology from abroad.Thus,we create a low cost and quality machines.So, many printing machine outside there have larger size.**Figure 1.2** shown how a bigger size of printing machine there are.

Figure 1.2 : H*ow a bigger size of printing machine there are.*

As we can see figure 1.2, we can conclude also that the price also very expensive.This is because these machine was using for heavy industry.Actually, the prices of machine can reaches thousand of ringgit.So as we can see in online,we all can see that many manucfacture out there sell their machine very expensive.**Figure 1.2.1** shown the price were sold by manucfacture.

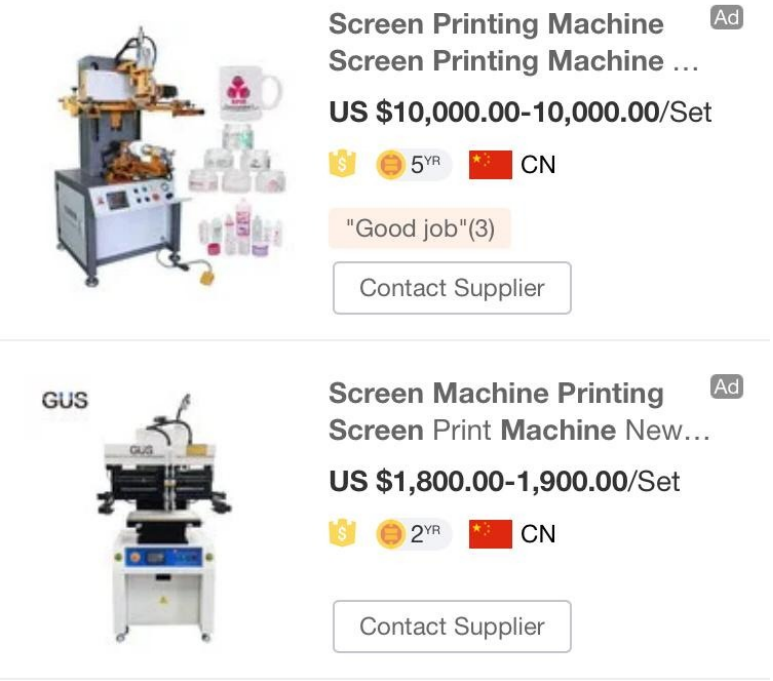


Figure 1.2.1 : *The price were sold by manucfacture.*

1.3 RESEARCH OBJECTIVES

The objectives to this research are:

i. To create a new jobs who want to start doing small buniness.

ii. Easily to carry printing machine everywhere.

iii. To save energy for people to do printing work.

1.4 RESEARCH QUESTIONS

This study will answer the following research questions:

i. Is it possible to create a printing machine that are high in quality?

ii. What type of material that can be used to make printing machine cheaper?

iii. What are the possibilities of making printing machine is faster?

1.5 SCOPE OF RESEARCH

The scopes and limits to this research are:

I. This product could not be exposed to water frequently.

II. This product could decompose naturally.

III. Not suitable for larger industries

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

1.6 SIGNIFICANCE OF RESEARCH

The project was designed to meet the needs of printing clothes for small buniness or anyone who has wanted to print the clothes. Lots of people out there are annoyed by spending their money to go to shop to print a clothes and it for small buniness want to start a buniness with low capital to increase their monthly income based on our customer survey. In addition, most of printing machine in market are either for industry use or too expensive. We are trying to build printing machine at a cheap cost to serve most people.

1.7 CHAPTER'S SUMMARY

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

CHAPTER 2

LITERATURE REVIEW

2.1 INTRODUCTION

In this chapter, it will be shown three material used in making screen printing in the current markets. These four materials have its own advantages and disadvantages. Hence, all the characteristics of those materials will be compared to our own product which has its own specialities and benefits. In this modern era, the screen printing was very bulky and does not function very well. Back in those days, screen printing can help small traders to start a business .

In this modern age, human beings are always busy doing their work. The progress made today makes the work easier, faster and more efficient. However, in this bustle there are still many people doing business to increase income. The analysis that has been made based on the study has shown that most of the population in Malaysia has a high standard of living. With the advent of printing machine it will make it easier for people to print on clothes and bags.

Printing is an important element of a product marketed in marketing and guarantees the beautiful and neatness of the product. Consumers, on the other hand, play a role in determining the appropriate pattern and shape of the product. The printing method also describes the quality of the product and the identity of the company that manufactures the product. The product printing method includes how the product is printed, the materials used in printing, the characteristics and specifications of the printing. The process of selecting the best printing method needs to be done so that the products produced easily get a place in the market and can be marketed well.Unfortunately, the cost of a printing machine costs quite a high. This causes traders who want to start a business such as selling clothes such as shirts and jerseys need high capital. Usually traders who want to start a business do not have enough capital to buy a printing machine.Therefore, this study revolves around designing and developing a prototype printing machine. To design the mechanism that will be used for the printing machine to function. A series of tests will be performed on the prototype to ensure that it meets the specifications that have been set and works well.

2.2 Screen Printing Machine

2.2.1 Introduction

Wood is a porous and fibrous structural tissue found in the stems and roots of trees and other woody plants. It is an organic material – a natural composite of cellulose fibers that are strong in tension and embedded in a matrix of lignin that resists compression. Wood is sometimes defined as only the secondary xylem in the stems of trees, or it is defined more broadly to include the same type of tissue elsewhere such as in the roots of trees or shrubs.[citation needed] In a living tree it performs a support function, enabling woody plants to grow large or to stand up by themselves. It also conveys water and nutrients between the leaves, other growing tissues, and the roots. Wood may also refer to other plant materials with comparable properties, and to material engineered from wood, or wood chips or fiber.

Wood has been used for thousands of years for fuel, as a construction material, for making tools and weapons, furniture and paper. More recently it emerged as a feedstock for the production of purified cellulose and its derivatives, such as cellophane and cellulose acetate.

As of 2005, the growing stock of forests worldwide was about 434 billion cubic meters, 47% of which was commercial. As an abundant, carbon-neutral[citation needed] renewable resource, woody materials have been of intense interest as a source of renewable energy. In 1991 approximately 3.5 billion cubic meters of wood were harvested. Dominant uses were for furniture and building construction. A 2011 discovery in the Canadian province of New Brunswick yielded the earliest known plants to have grown wood, approximately 395 to 400 million years ago. Wood can be dated by carbon dating and in some species by dendrochronology to determine when a wooden object was created. People have used wood for thousands of years for many purposes, including as a fuel or as a construction material for making houses, tools, weapons, furniture, packaging, artworks, and paper. Known constructions using wood date back ten thousand years. Buildings like the European Neolithic long house were made primarily of wood. Recent use of wood has been enhanced by the addition of steel and bronze into construction. The year-to-year variation in tree-ring widths and isotopic abundances gives clues to the prevailing climate at the time a tree was cut.

2.2.2 Characteristics of Wood

2.2.2.1 Advantages of Wood

Tensile strength – For being a relatively lightweight building material, wood outperforms even steel when it comes to breaking length (or self-support length). Simply put, it can support its own weight better, which allows for larger spaces and fewer necessary supports in some building designs.

Electrical and heat resistance – Wood has a natural resistance to electrical conduction when dried to standard moisture content (MC) levels, usually between 7%-12% for most wood species. (This conductivity is, in fact, the basis for one type of moisture measurement system.) Its strength and dimensions are also not significantly affected by heat, providing stability to the finished building and even safety implications for certain fire situations.

Sound absorption – Wood's acoustic properties make it ideal for minimizing echo in living or office spaces. Wood absorbs sound, rather than reflecting or amplifying it, and can help significantly reduce noise levels for additional comfort.

Beauty – With the wide variety of species available, wood presents an incredible range of aesthetic options, as well as provides varied mechanical, acoustic, thermal properties along with others that can be selected based on the need of the building project.

2.3 SCREEN PRINTING MACHINE

2.3.1 What is Screen Printing Machine

Screen printing is a printing technique where a mesh is used to transfer ink onto a substrate, except in areas made impermeable to the ink by a blocking stencil. A blade or squeegee is moved across the screen to fill the open mesh apertures with ink, and a reverse stroke then causes the screen to touch the substrate momentarily along a line of contact. This causes the ink to wet the substrate and be pulled out of the mesh apertures as the screen springs back after the blade has passed. One colour is printed at a time, so several screens can be used to produce a multi-coloured image or design.

There are various terms used for what is essentially the same technique. Traditionally, the process was called screen printing or silkscreen printing because silk was used in the process. It is also known as serigraphy and serigraph printing. Currently, synthetic threads are commonly used in the screen printing process. The most popular mesh in general use is made of polyester. There are special-use mesh materials of nylon and stainless steel available to the screen-printer. There are also different types of mesh size which will determine the outcome and look of the finished design on the material.

Technique screen printing

A screen is made of a piece of mesh stretched over a frame. The mesh could be made of a synthetic polymer, such as nylon, and a finer and smaller aperture for the mesh would be utilized for a design that requires a higher and more delicate degree of detail. For the mesh to be effective, it must be mounted on a frame and it must be under tension. The frame which holds the mesh could be made of diverse materials, such as wood or aluminum, depending on the sophistication of the machine or the artisan procedure. The tension of the mesh may be checked by using a tensiometer; a common unit for the measurement of the tension of the mesh is Newton per centimeter (N/cm). A stencil is formed by blocking off parts of the screen in the negative image of the design to be printed; that is, the open spaces are where the ink will appear on the substrate. Before printing occurs, the frame and screen must undergo the pre-press process, in which an emulsion is 'scooped' across the mesh. Once this emulsion has dried, it is selectively exposed to ultra-violet light, through a film printed with the required design. This hardens the emulsion in the exposed areas but leaves the unexposed

parts soft. They are then washed away using a water spray, leaving behind a clean area in the mesh with the identical shape as the desired image, which will allow passage of ink. It is a positive process.

In fabric printing, the surface supporting the fabric to be printed (commonly referred to as a pallet) is coated with a wide 'pallet tape'. This serves to protect the 'pallet' from any unwanted ink leaking through the screen and potentially staining the 'pallet' or transferring unwanted ink onto the next substrate.

Next, the screen and frame are lined with a tape to prevent ink from reaching the edge of the screen and the frame. The type of tape used in for this purpose often depends upon the ink that is to be printed onto the substrate. More aggressive tapes are generally used for UV and water-based inks due to the inks' lower viscosities and greater tendency to creep underneath tape.

The last process in the 'pre-press' is blocking out any unwanted 'pin-holes' in the emulsion. If these holes are left in the emulsion, the ink will continue through and leave unwanted marks. To block out these holes, materials such as tapes, speciality emulsions and 'block-out pens' may be used effectively. The screen is placed atop a substrate. Ink is placed on top of the screen, and a floodbar is used to push the ink through the holes in the mesh. The operator begins with the fill bar at the rear of the screen and behind a reservoir of ink. The operator lifts the screen to prevent contact with the substrate and then using a slight amount of downward force pulls the fill bar to the front of the screen. This effectively fills the mesh openings with ink and moves the ink reservoir to the front of the screen. The operator then uses a squeegee (rubber blade) to move the mesh down to the substrate and pushes the squeegee to the rear of the screen. The ink that is in the mesh opening is pumped or squeezed by capillary action to the substrate in a controlled and prescribed amount, i.e. the wet ink deposit is proportional to the thickness of the mesh and or stencil. As the squeegee moves toward the rear of the screen the tension of the mesh pulls the mesh up away from the substrate (called snap-off) leaving the ink upon the substrate surface.

There are three common types of screen printing presses: flat-bed, cylinder, and rotary. Textile items printed with multi-coloured designs often use a wet on wet technique, or colours dried while on the press, while graphic items are allowed to dry between colours that are then printed with another screen and often in a different colour after the product is re-aligned on the press. Most screens are ready for re-coating at this stage, but sometimes screens will have to undergo a further step in the reclaiming process called dehazing. This additional step removes haze or "ghost images" left behind in the screen once the emulsion has been removed.

Ghost images tend to faintly outline the open areas of previous stencils, hence the name. They are the result of ink residue trapped in the mesh, often in the knuckles of the mesh (the points where threads cross).
While the public thinks of garments in conjunction with screen printing, the technique is used on tens of thousands of items, including decals, clock and watch faces, balloons, and many other products. The technique has even been adapted for more advanced uses, such as laying

down conductors and resistors in multi-layer circuits using thin ceramic layers as the substrate.

2.4 MATERIAL SELECTION

2.4.1 INK

PLASTISOL INK

Most people involved in screen printing tend to use Plastisol ink. It is thick, durable, versatile, and provides clear graphic detail. Plastisol ink is also easy to mix, long-lasting, widely available, comes in a wide array of colors, and works well with a wide range of screen printing methods, equipment, and designs. It can also stay on the screen for long periods of time without drying out. This type of ink's high density prevents it from arching and its low viscosity allows it to work well with softer prints. It also provides a low gloss, flat finish. Plastisol ink needs heat to dry.

WATER-BASED INK

Some people prefer water-based ink because it soaks into the fibers of the fabric on which it is used rather than sitting on top of it like Plastisol does. This gives the screen print a softer feel compared to those made using Plastisol ink. Some people find it gives the print a more solid feel as well. Plus, water based inks are easy to use even for printers without much experience or skill. However, it can take a longer time to dry in humid conditions and may require the use of a heat source. This type of ink is semi-transparent and may require custom color matching to produce a uniform look throughout the garment. It may also require a high count mesh screen and a retarder to prevent flooding of the design.

DISCHARGE INK

Discharge ink is available in both Plastisol and water-based types. When using discharge ink,

the ink removes the color of the fabric on the areas where it is applied and replaces it with its pigment. This makes discharge ink a popular choice for people working with 100% cotton. It is necessary to use a heat source in order for fabrics silk screened with discharge ink to fully cure. Using this type of ink does require a fairly high level of expertise.
The type of ink that you should choose to do your screen printing depends on a number of factors. These include the type of application, space restrictions, environmental concerns, economic limitations, and your end goals. Water-based ink has risen in popularity due to its eco-friendly reputation. New Plastisol inks are being developed to be environmentally safe as well.

Figure 2.4.1: *Ink*

2.4.2 SQUEEGEE

In screen printing, a squeegee is used to spread ink evenly across the back of a stencil or silkscreen, making a clean image on the printed surface. Screen-printing squeegees usually have much thicker and less flexible blades than the window cleaning variety.

A squeegee is also used in photography printing on fabric to dry the photographic paper after it is washed, preventing wrinkles or water spots.

The earliest reference to a squeegee used for drying in photography is an 1878 description by chemist and photographer William Abney of squeezing excess water away. His squeegee had no handle, and was "a flat bar of wood, into which is let a piece of india-rubber about 1/2 centimetre thick and 2 centimetres broad." The user should note that "the india-rubber of the squeegee must be brought to bear with considerable pressure on to the surface of the paper, and the strokes made with it should commence from the centre and finish towards the ends.

Figure 2.4.2 : *Squeegee*

2.4.3 SCREEN MESH

Originally screen mesh was made from silk fibers. Today decorative printing is done with screens made from polyester filament and screen printing for electronics is done mostly with screens made with stainless steel wire. Stainless steel wire is used in applications where dimensional stability is required to achieve high tolerances. For electronics it is important that the printed features do not change position so that subsequent prints will be aligned.

Screens are defined by their mesh count, wire diameter, wire bias, emulsion thickness, and tension. Mesh count is the number of wires/fibers per inch. The screen mesh count is a primary factor for controlling print thickness. Print thickness decreases inversely with mesh count. As the mesh count is increased the wire diameter must be reduced to maintain sufficient open area in the screen mesh for quality prints. The percentage of open area of a screen equals [1−(M×D)]2 where M=mesh count (wire in−1) and D=wire diameter (in).

Screens are fabricated by attaching a metal frame to tensioned screen mesh. A metal frame is oriented to the mesh to establish the desired wire bias. Wire bias (angle of wire to frame) typically is fixed between 22° and 45°. A base coat or fill coat of emulsion is applied to the screen mesh to close all the open mesh. More emulsion is applied for increased thickness. A photopositive of the circuit pattern is placed on to the emulsion which is exposed to UV to image the screen. The pattern not exposed to UV is washed out (aqueous wash) and becomes the area that is printed (Bacher and Dobie 1999).

The wet print thickness can be approximated by the percentage open area times the weave thickness plus the emulsion thickness where the weave thickness is about 10% more than two times the wire diameter (Freska 1987, Ranachi et al. 1986).

Print resolution is inversely proportional to wire diameter. Resolution as measured by line width and the space between lines has improved in the last 10 years from 200 microns lines and spaces (800 micron line pitch) to 75 micron lines and spaces (150 micron line pitch). Much of this improvement came from screens made from wires with special metal alloys with smaller diameters, e.g., 350 mesh screen with 16 micron wire.

Figure 2.4.3 : *Screen mesh*

2.4.4 SCREEN PRINTING SCREEN FRAME

Production of screen printing screen Frames materials used are mainly wood, hollow aluminum, aluminum molding frame, steel and other materials. The most commonly used is the aluminum frame made of aluminum. However, all kinds of screen printing screen frames have their own characteristics. When selecting, the screen frames of different materials can be selected according to different situations. The following are the introduction of three kinds of screen printing screen frames:

Wood Screen Printing Screen Frames with simple production, light weight, easy operation, low price, stretching method is simple and so on. This Wood Screen Printing Frames is suitable for manual printing. However, this kind of wood frame material is solvent-resistant, has poor water resistance, easily deformed after immersion, and affects printing accuracy. This kind of Wood Screen Printing ScreenFrames is commonly used in the past and is rarely used now.

Figure 2.4.4 : *Screen frame*

2.5 CHAPTER'S SUMMARY

As to conclude this chapter, literature review is important to showcase all the studies of materials and methods to enhance the knowledge on this project. Every thesis and others projects that are related to this bio-friendly polymer screen printing is really helpful especially for us to understand it fully.

After a lot of materials and methods were discussed and researches were done, the materials that are the most compatible for our project is thermoset. Due to its characters and advantages . This is because of its low cost benefits and great for beginner's process.

After all the discussions through data analysis, we can conclude that this project provides many benefits to the community, especially for the use of traders in printing. This project can

help them solve problems easily and quickly. In addition, it also save time to do work in the place where they do clothing printing. Although this project requires more time and challenge but it can work quickly and smoothly. Hopefully this project will continue and upgrade for better goods.

CHAPTER 3

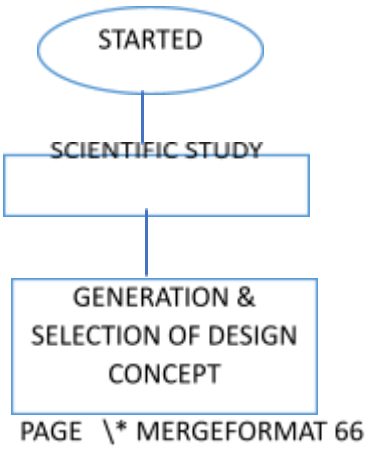
METHODOLGY

3.1 INTRODUCTION

What is methodology? A methodology is a plan-of-attack, especially when that plan-of-attack is used repeatedly. This might be obvious, but the word methodology is related to the word method. In fact, a methodology is a system of methods followed consistently. Scientists, for example, use various methodologies as they perform experiments. It might seem like the world is nothing but chaos and disorder. But actually, sometimes there is a method to this madness. And sometimes there's a methodology.

In this chapter, there will be a lot of information about the process and journey through out the making of our final project. There will be flow chart showing the process of us making the whole project. This flow chart will explain the processes we took. Next, is the Gantt Chart, which will show the actual and planning throughout all the 13 weeks of our final year project journey.

3.2 FLOW CHART



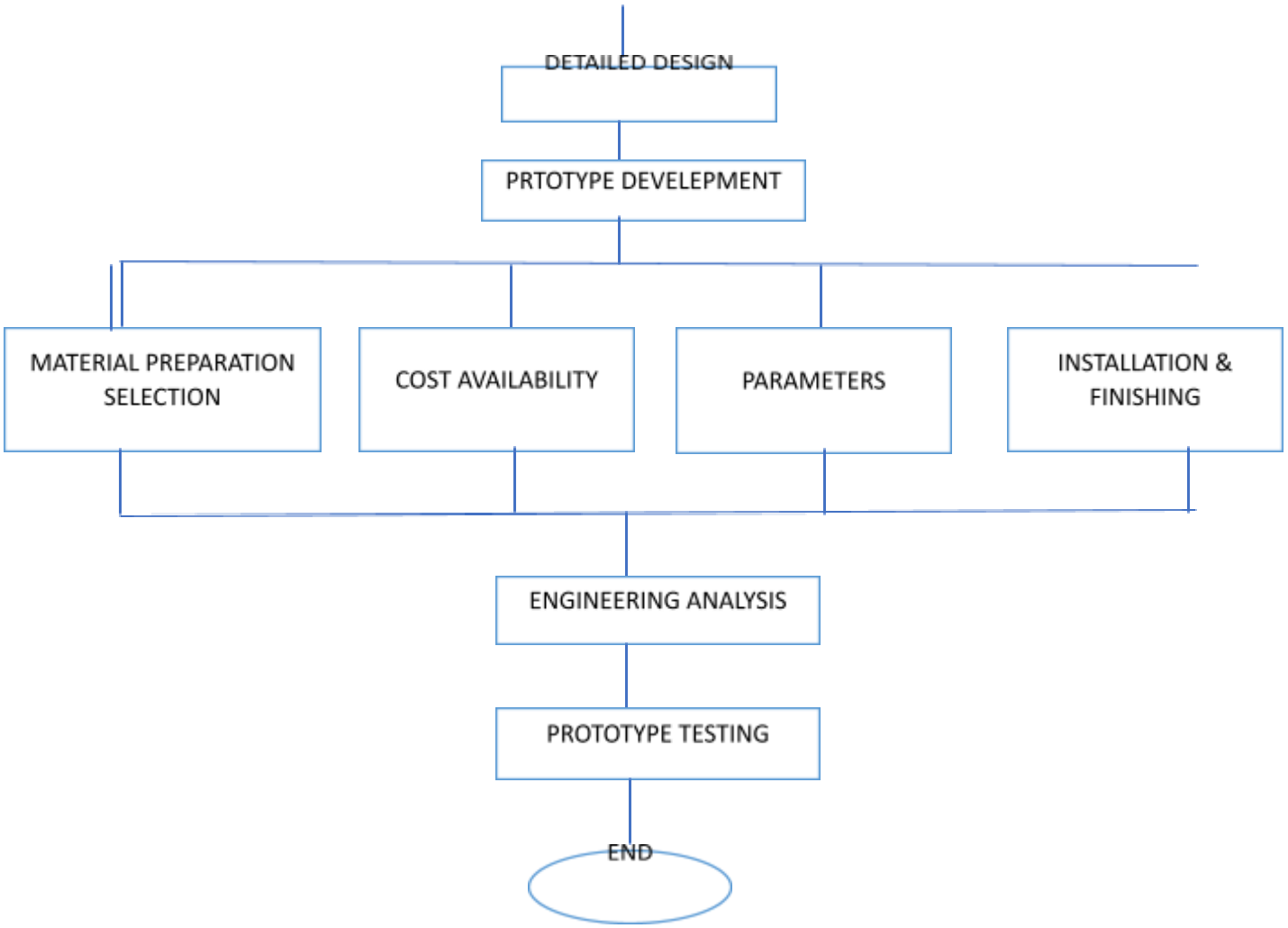


FIGURE 3.2 : *Flow Chart of printing machine.*

3.3 FLOW CHART EXPLAINATION

- **Scientific Study**

  Scientific study is where how we can research and discuss about our project . However, it is very important because it can make easily for development of prototype . based on this scientific study , we can get some knowledge to handle this project ,and it can't waste our time during development of prototype

- **Generation and selection of design concept .**

  In this topic , we make some discuss about generation and selection of design concept . For the example it is about design and material what we use for our project. It is very important because , in this moment the consumers need the product can give them some of benefic . so from this discussion, we can solve the problem easily .

- **Detailed design .**

  Detailed design is the process after we discuss about generation and selection of design concept . in this step , we check our design of product very meticulous and carefully . The importance of us checking this detailed design is to identify every inch of the product we will produce . If there is an error or defects, we can repair the defects found in our product .

- **Prototype development**

  this step we will make after finishing doing a detailed design on our prototype .With the development of this prototype we can see in detail about our prototype , if there is something we need to improve . This so ,we can ensure that our prototype is in perfect condition as we planned before .

- **Material preparation selection .**

1. Squegee

Figure 3.3.1 : *Squeegee*

A tool possessing a wooden or metal handle to which is attached a thin, flexible rubber or plastic blade. A squeegee is used in screen printing to force ink through the printing screen and onto the substrate.

2. Photo Emulsion

Figure 3.3.2 : *Photo emulsion*

Photo emulsion is thick liquid substance which reacts to light. Essentially, photo emulsion becomes "tougher" when exposed to light, making it more difficult to remove from surfaces. That's perfect for creating a stencil: we'll "toughen" up.

3. Scoop Coater

Figure 3.3.3 : *Scoop coater*

The scoop coater is designed to provide a perfect coating angle that can be controlled easily with a comfortable handling. They can be used with any liquid emulsion for any mesh count while providing a smooth and evenly layer of emulsion on your screen every time.

4 .Silk Screen

Figure 3.3.4 : *Silk screen*

Silkscreen process is a printmaking technique in which a mesh cloth is stretched over a heavy wooden frame and the design, painted on the screen by tusche or affixed by stencil, is printed by having a squeegee force color through the pores of the material in areas not blocked out by a glue sizing.

5. Ink

Figure 3.3.5 : *Ink*

The most commonly used inks for silk screening are oil-based Plastisol ink, water-based suede, discharge, and expanding ink. People interested in more eco-friendly ink can use PVC and Phthalate-free types.

6. Film Positive

Figure 3.3.6 : *Film positive*

A film positive is required when using the photographic screen process. It consists of an opaque image on a transparent sheet, such as acetate or prepared acetate, Or make your design on a computer and print it on a laser printer film.

- **Cost availability**

  The process of cost availability is one of the most important process in this final year project. The main factor of cost availability is to discuss and calculate the total cost that has been used for our project.

- **Parameters**

  A project Parameter is any piece of data that needs to be shared by members of a project , for example is The most recent price for a part, the earliest possible date for delivery of a part, the maximum building height, the current labor rate for a type of service and the color of an item, selected from a list of pre-defined colors .

- **Installation and finishing**

  Now its about installation and finishing. This process is very important to because proper product installation and finishing is key to success in every job. proper finishing is critical and deserves careful consideration to achieve the desired result.

- **Engineering analysis**

  Engineering analysis involves the application of scientific analytic principles and processes to reveal the properties and state of a system, device or mechanism under study. Engineering analysis is decompositional it proceeds by separating the engineering design into the mechanisms of operation or failure, analyzing or

estimating each component of the operation or failure mechanism in isolation, and re-combining the components according to basic physical principles.

- **Prototype testing .**

Prototype testing is carried out to determine the strength and end result of the product . A prototype is an early sample, model, or release of a product built to test a concept or process. It is a term used in a variety of contexts, including semantics, design, electronics, and software programming. A prototype is generally used to evaluate a new design to enhance precision by system analysts and users.

Result :

3.4 INTERVIEW AND RESEACRH

The idea we got to create a printing machine came when we made preparations from small business in the field of printing out there. We use the same concept but have improvements on our printers that is by adding a wooden stick that combines "squeegee" to prevent printing process not messy and dirty. Apart from that, the improvement of this project also does not use a lot of energy. There is wood that works to move the "squeegee" forward and backward. We innovate so that our printers have a process that is easy to operate and easy to print images on objects. . This concept can also be adjusted downwards when we want to do printing on an object and can be moved upwards for the maintenance process.

References :

[1]https://www.art2silkscreen.co.uk/?gclid=EAIaIQobChMI8eWd4OGB7AIVUXRgCh3-1gkyEAAYASAAEgJeX_D_BwE

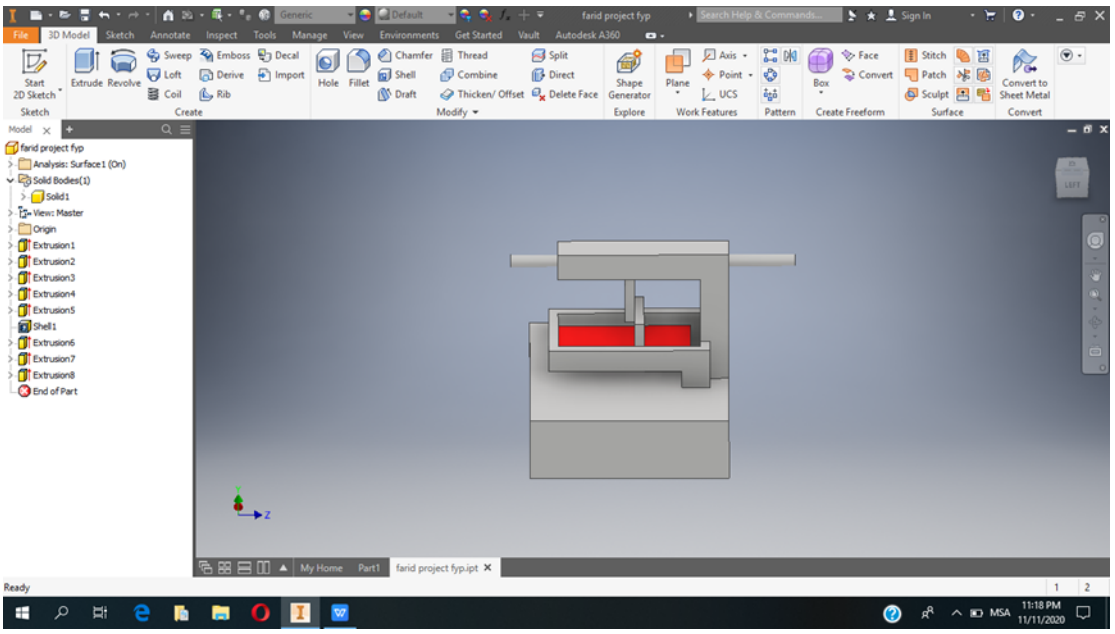
[2]https://once-tech.com/cylindrical-screen-printing-machines/?gclid=EAIaIQobChMI8eWd4OGB7AIVUXRgCh3-1gkyEAAYAyAAEgJAOfD_BwE

[3]https://youtu.be/YxQaKGD4ihk

[4]https://www.google.com/search?ei=2I1sX_y_K9zfz7sPmNSE4AY&q=kesimpulan+yang+boleh+dibuat+berdasarkan+silkscreen+machine&oq=kesimpulan+yang+boleh+dibuat+berdasarkan+silkscreen+machine&gs_lcp=ChNtb2JpbGUtZ3dzLXdpei1zZXJwEAM6BAgAEEc6BAgeEApQ8n5Y7YACYPOEAmgAcAF4AIABtgKIAZQVkgEINS4xMi4yLjGYAQCgAQHIAQjAAQE&sclient=mobile-gws-wiz-serp

[5]https://www.google.com/amp/s/amridesignenterprise.wordpress.com/2013/10/08/mengenali-peralatan-bahan-cetakan-silk-screen-bahagian-1-3/amp

3.5 : PROJECT DESIGN



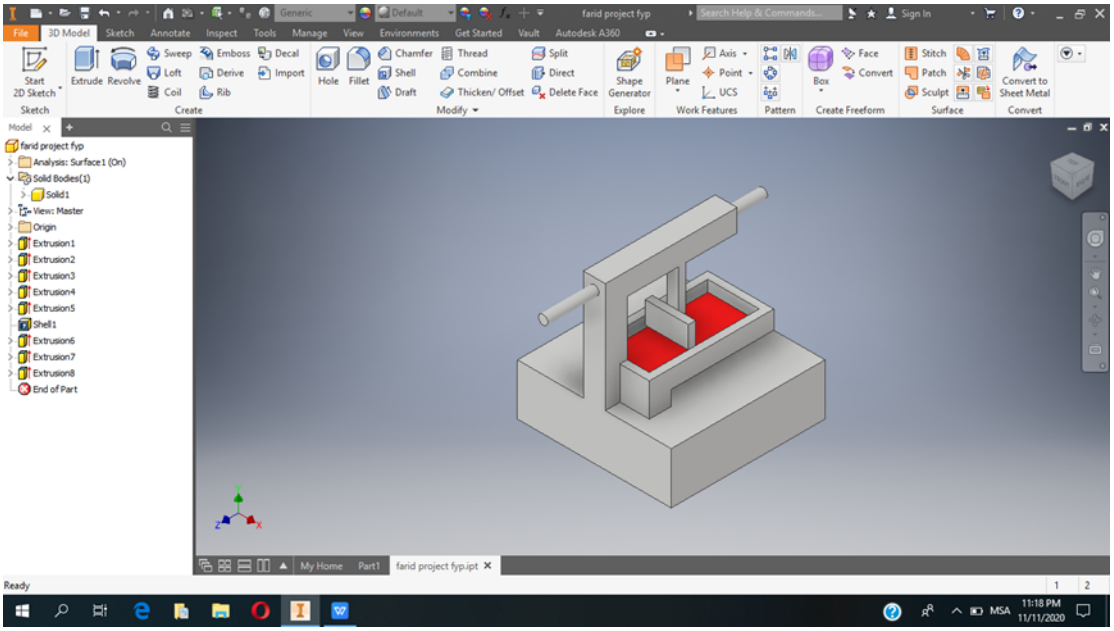


Figure 3.5.2 : *Project design*

3.6 : OPERATIONAL METHODOLOGY

Figure 3.6.1 : Prototype development	**Figure 3.6.2 :** *Prototype testing*

- Prototype development

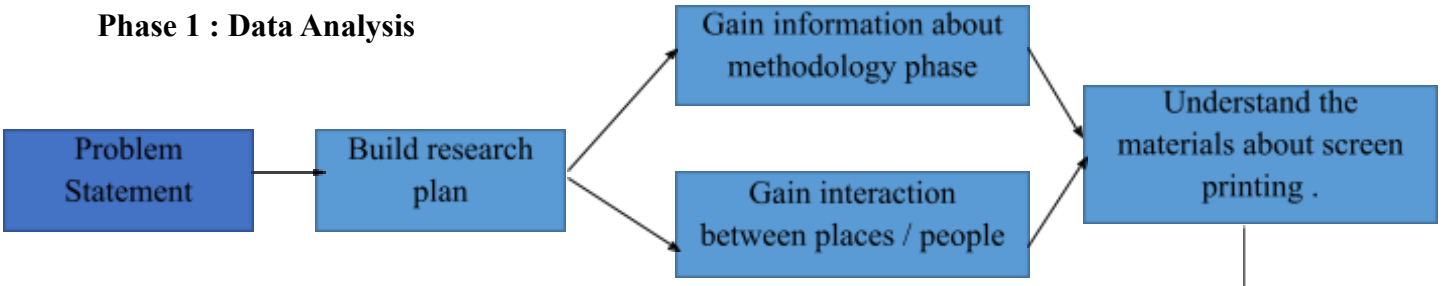
This step we will make after finishing doing a detailed design on our prototype .With the development of this prototype we can see in detail about our prototype , if there is something we need to improve . This so ,we can ensure that our prototype is in perfect condition as we planned before .

- Prototype testing

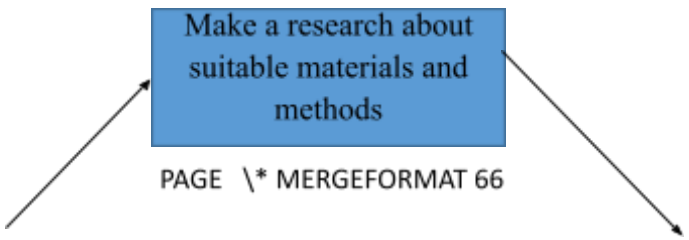
Prototype testing is carried out to determine the strength and end result of the product . A prototype is an early sample, model, or release of a product built to test a concept or process.

3.7: METHODOLOGY PHASE

Phase 1 : Data Analysis



Phase 2 : Method and Material



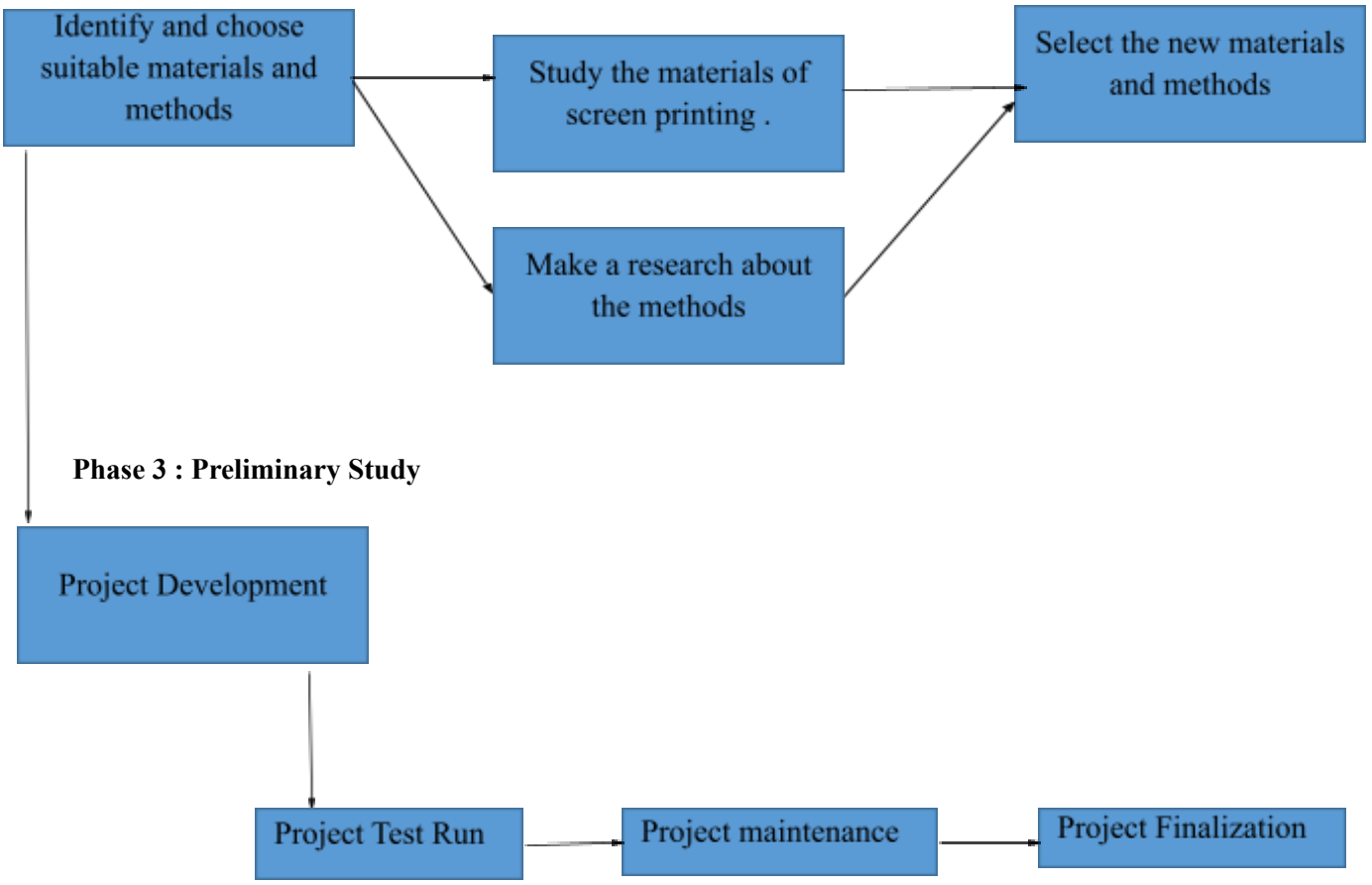


Figure 3.7 : *Methodology phase*

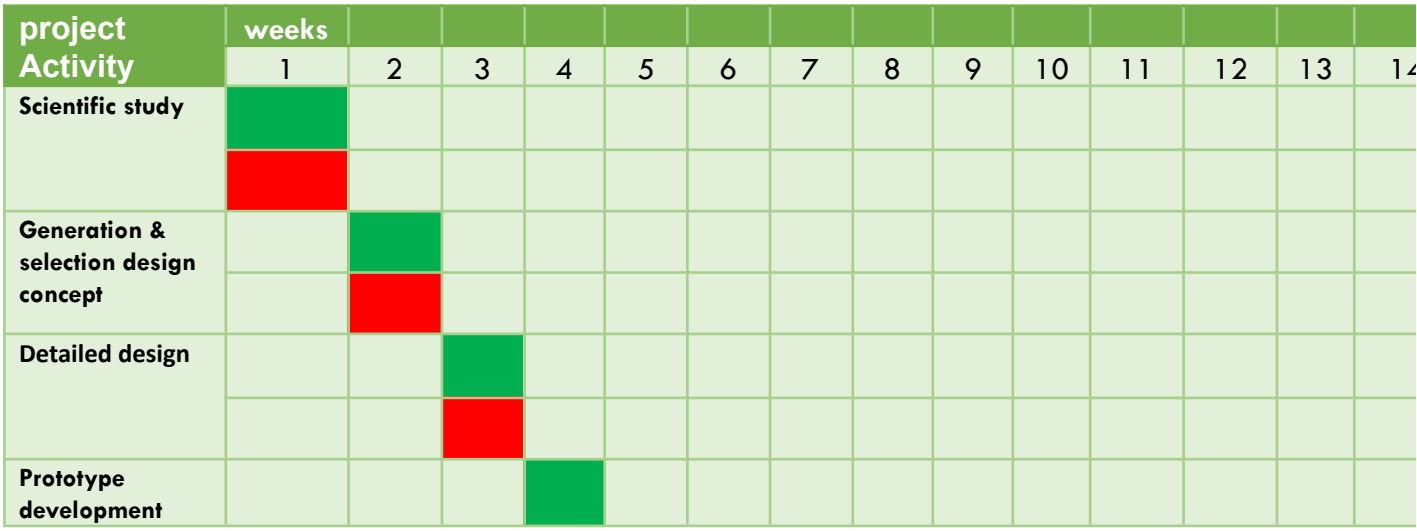
3.8: BUDGET CALCULATION

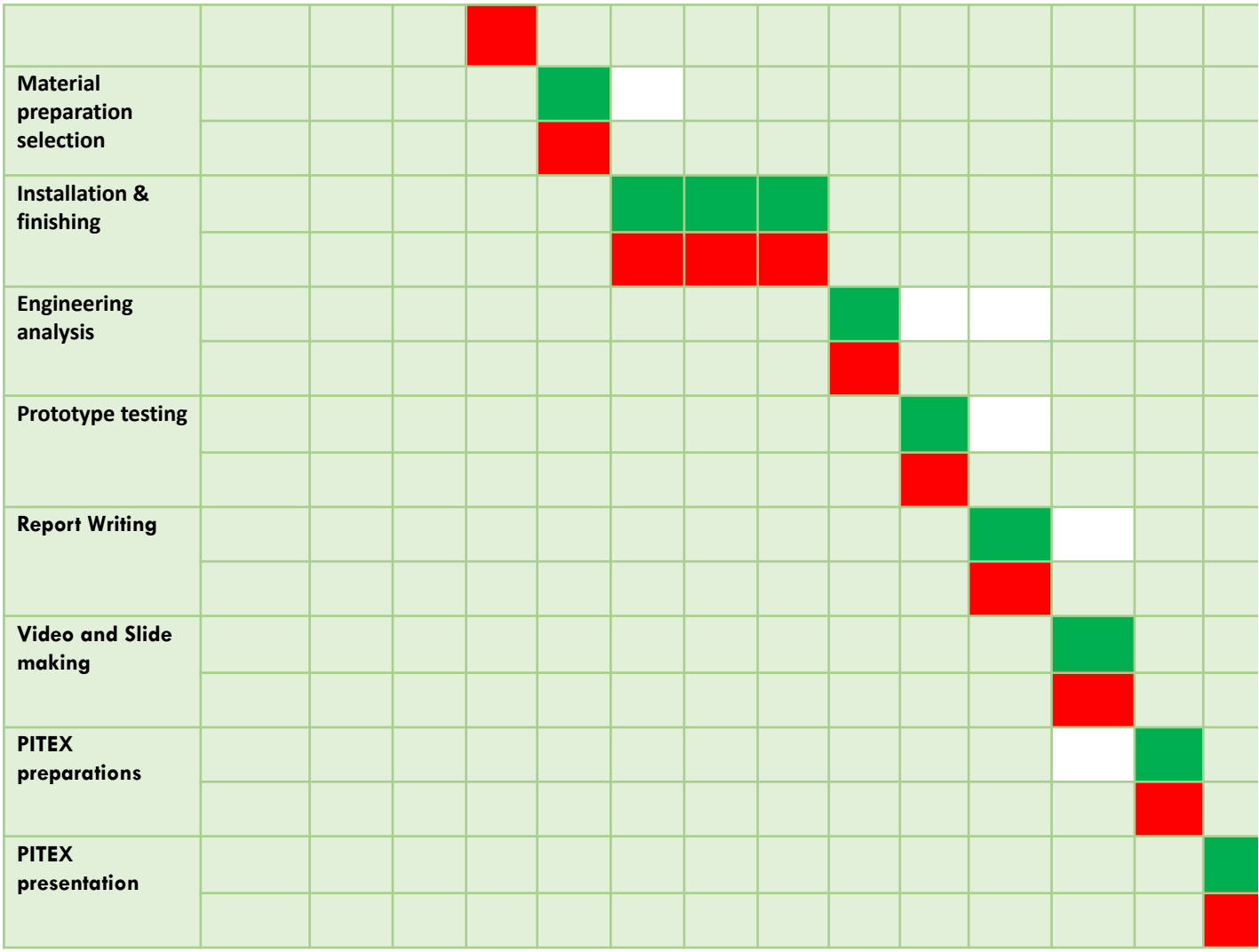
No	Materials / Equipment	Amount	Price
1.	Photo elmusion	1 unit	RM 7
2.	Squegee	1unit	RM10
3.	Ink	1unit	RM18

4.	Nut	10 unit	RM15
5.	Rode	1 unit	RM8
6.	Silk screen	1 unit	RM14
7.	Clothes / bags	20 unit	RM70
8.	Wood	1 unit	RM55
9.	Scoop coater	1 unit	RM 11
10.	Positive film	2/3unit	RM 9
11 .	Screen frame	1unit	RM10
Total			RM227

Table 3.8 : *Budget calculation*

3.9 PROJECT ACTIVITY





3.10 : CHAPTER'S SUMMARY

As to conclude this chapter ,methodology is very important to us because there will be a lot of information about the process and journey through out the making of our final project. There will be flow chart showing the process of us making the whole project. This flow chart will explain the processes we took. Next, is the Gantt Chart, which will show the actual and planning throughout all the 13 weeks of our final year project journey.

CHAPTER 4

FINDINGS AND ANALYSIS

4.1 INTRODUCTION

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

4.2 ADVANTAGE AND DISADVANTAGE

Every project has its own pros and cons, the pros will help the people and also the environment. However, the cons or the disadvantages must be improved or change for the future so that we could enhance the good and very efficient product that hardly to find disadvantage of the project.

The Advantage of Printing Machine are shown in table 4.2:-

◆ Cost effective for large quantities Since this is a method that requires the fabrication of screens for every color used in an artwork, it is best reserved for large orders. The more garments placed in an order then the cheaper the cost per unit will be.
◆ Easier to print on special garments. It is hard to find a printing method as versatile as screen printing. It can be done on almost any surface as long as it is flat, fabric, wood, plastic and even metal, among many others.
◆ Various inks can be used Screen printing allows for greater thickness of the ink than other techniques, which result in greater possibilities when it comes to the finish of the piece.
◆ Long lasting & durable quality.

Due to the composition and thickness of inks used in screen printing, designs placed with this method can withstand far more stress than others without losing the quality of the print.

The Disadvantage of Printing Machine are shown in table 4.2.1:-

❖ More money for multiple colors. Because of the technique of screen printing, only one color can be applied at a time. Therefore, the number of colors on a t-shirt are limited, and each layer demands more time, another screen and stencil, and ultimately, more money.
❖ Not practical for small orders. Screen printing needs more prep than other techniques before going into production. This doesn't make it suitable for "on-demand" printing, which is the creation of a garment as soon as it is ordered.

4.3 Data Analysis

The pie chart 4.3 below displays the gender distribution of respondents. According to the chart, 48% the respondents are male while 52% are female. This points clearly to the fact that the gender orientation of the study area is evenly distributed.

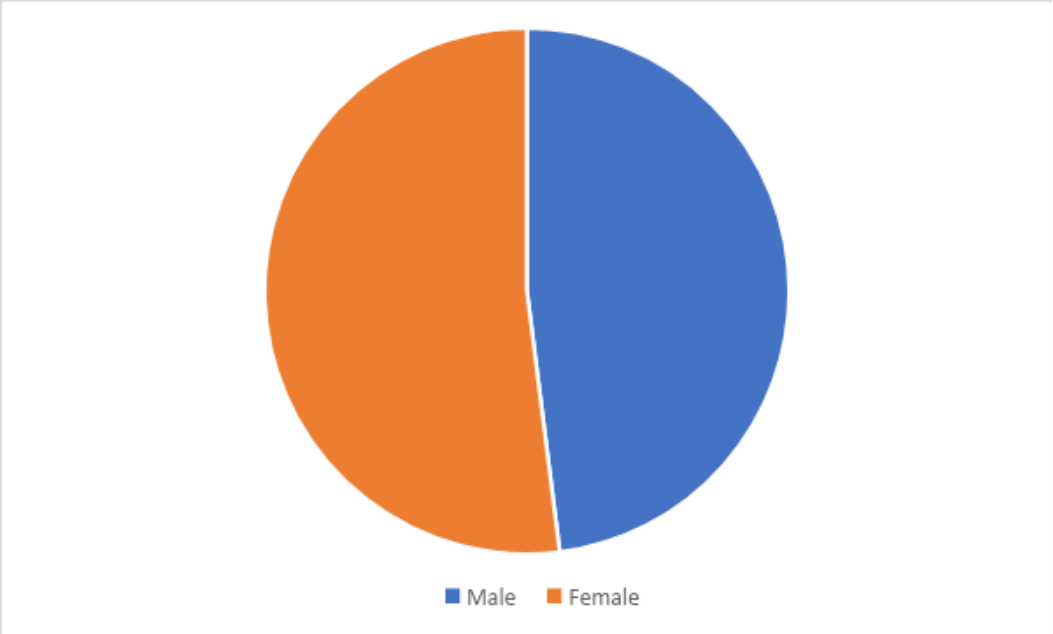


Chart 4.3: *Gender Distribution*

4.3.1 Age Distribution of Respondents

The chart 4.3.1 below shows the age distribution of respondents. It is clear from the chart that majority of respondents (40%) fall within the age bracket of 15-25 years. This suggests the maximum involvement of the middle-aged youth in the study. Furthermore, 25% of respondents who participated in the study fall within the age bracket of 26-30. Also, 20% of the respondents are within the age bracket of 31-40.

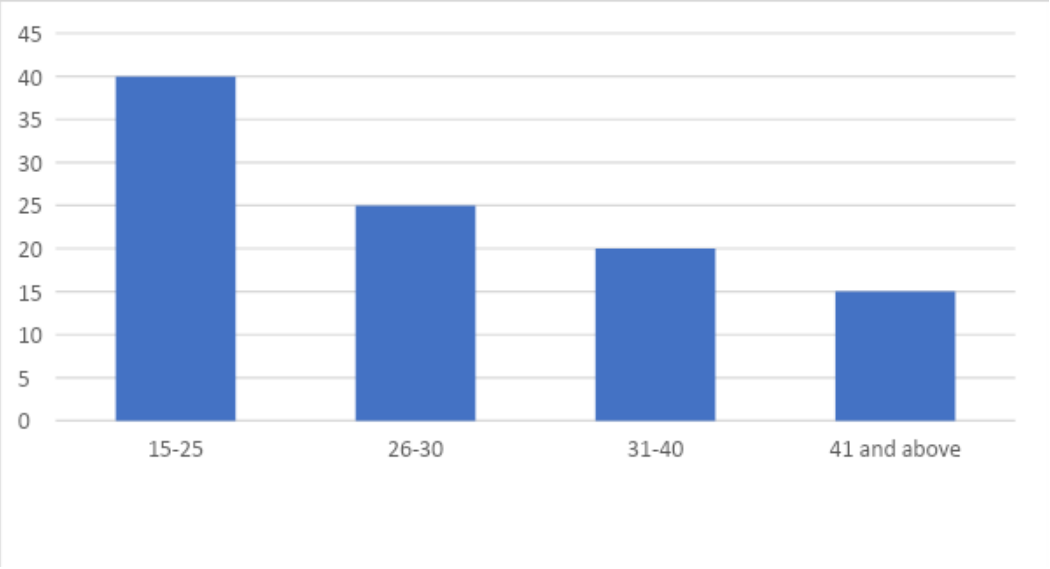


Chart 4.3.1 : *Age Distribution*

4.3.2 Occupational of Respondents

Chart 4.3.2 below displays the Occupational of respondents who participated in the study. The results are skewed in a descending order. Majority of the respondents 45% had Students. This is followed by 35% of the respondents who attended Employee. As many as 23% of the respondents were Others.

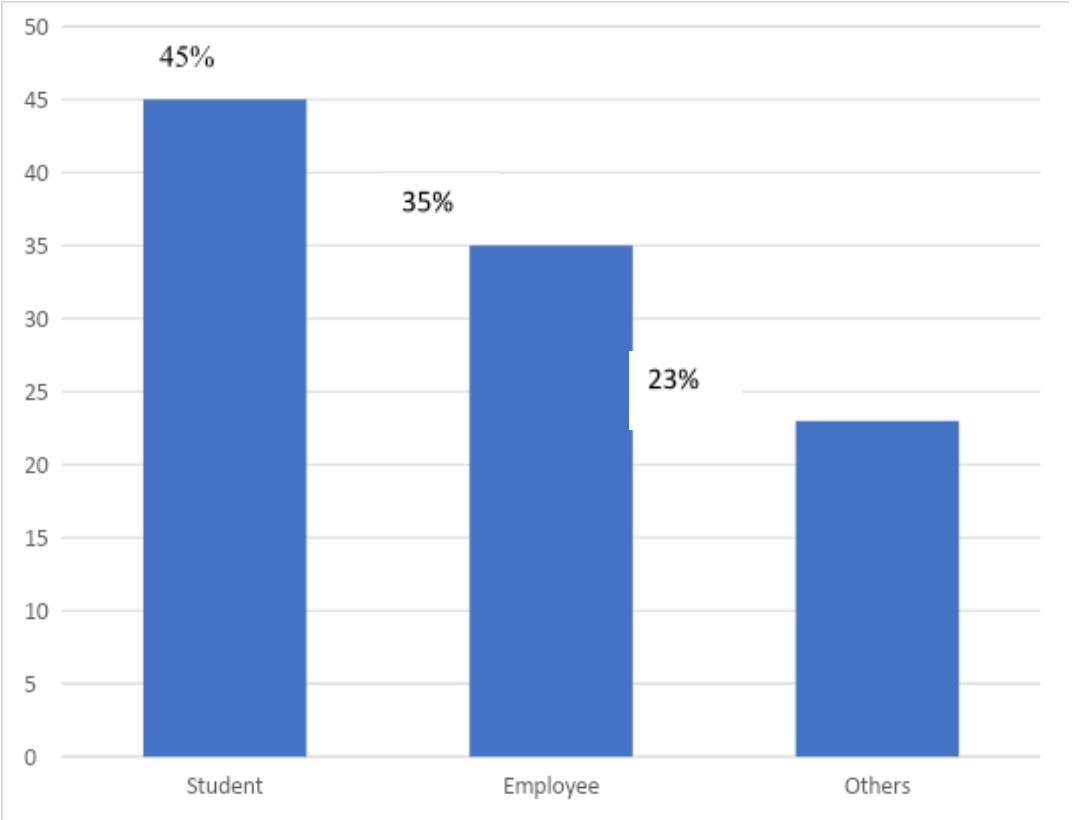


Chart 4.3.2 : *Occupational of Respondents*

4.3.3 Assessing Respondents' knowledge about Screen Printing

In chart 4.3.3 below, the researchers sought to assess the knowledge of respondents on screen printing. The results are as follows: a whopping sum of 107 respondents representing 99.9% of the sample population gave a response in the affirmative while 1 respondent representing a negligible percentage of 0.1 gave "No" as an answer. It is obvious from the results that majority of the respondents chosen for this study have knowledge on the topic under discussion.

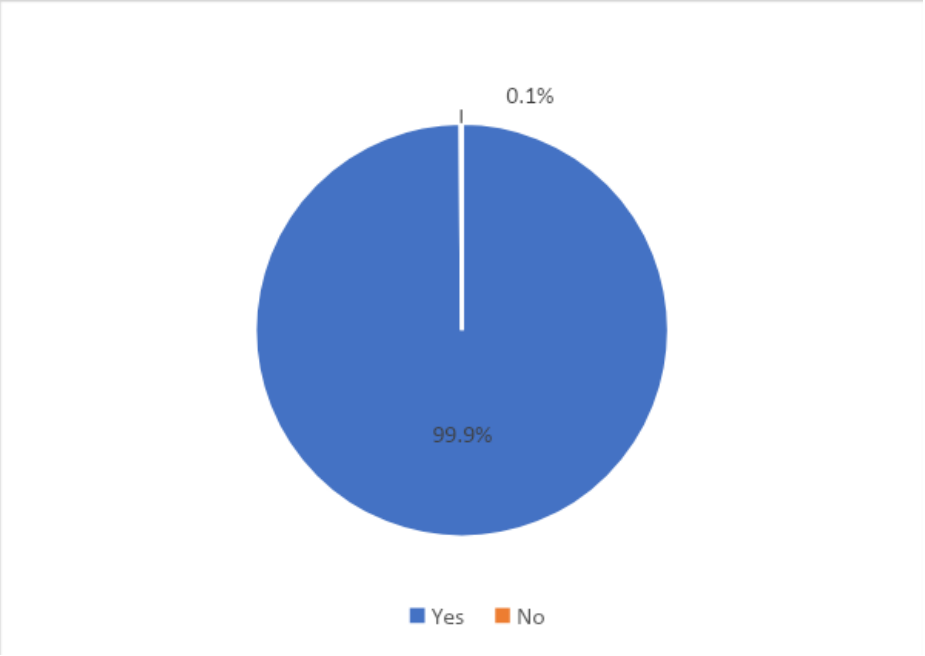


Chart 4.3.3 : *Knowledge about Screen Printing*

Responses	Frequency	Percentage (%)

Yes	107	99.9
No	1	0.1
Total	108	100

Table 4.3.3 : *Yes or No responses to the question: "do you have any knowledge about Screen Printing?*

4.3.4 Responses to the assertion: "Screen Printing is one of the methods of printing t-shirts"

Chart 4.3.4 below presents the test results obtained from respondents concerning the statement that screen printing is one of the methods of printing t-shirts. 80 respondents representing 74.1% of the sample population agreed to the assertion while 3 respondents representing 2.8% of the sample population disagreed with the assertion. Furthermore, 25 respondents representing 23.1% of the sample population strongly agreed to the assertion.

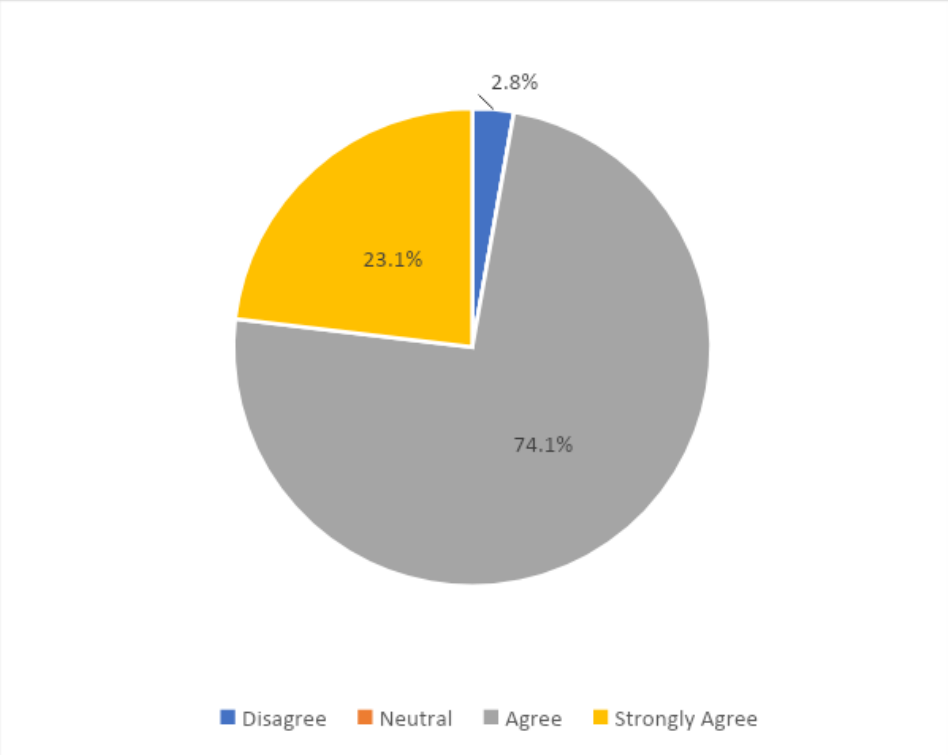


Chart 4.3.4 : *Screen Printing is one of the methods of printing t-shirts*

Responses	Frequency	Percentage (%)
Strongly disagree	0	0.0
Disagree	3	2.8
Neutral	0	0.0
Agree	80	74.1
Strongly agree	25	23.1
Total	**108**	**100**

Table 4.3.4 : *Responses to the statement: "Screen Printing is one of the methods of printing t-shirts*

4.3.5 Can printing machine increased an income for people who want to start a small buniness

Chart 4.3.5 below presents the test results of respondents on the assertion, "Can printing machine increased an income for people who want to start a small buniness". The results are as follows: a good number of the respondents (37) representing 34.26% of the sample population were neutral while 45 respondents representing 41.67% of the sample.

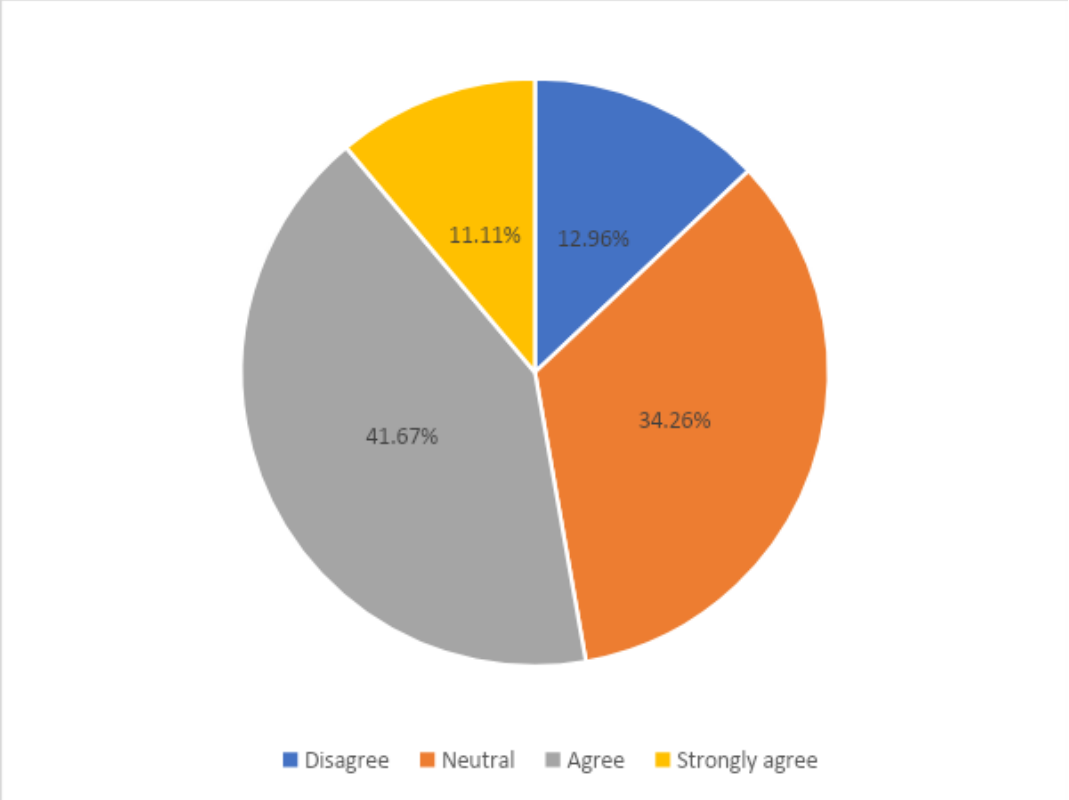


Chart 4.3.5 : *Can printing machine increased an income for people who want to start a small buniness*

Responses	Frequency	Percentage (%)
Strongly disagree	0	0.0
Disagree	14	12.96
Neutral	37	34.26
Agree	45	41.67
Strongly agree	12	11.11

Total	**108**	**100**

Table 4.3.5 : *Responses to the assertion: "Can printing machine increased an income for people who want to start a small buniness"*

4.3.6 Responses the design of printing machine

Chart 4.3.6 below presents there are many respondents was totally agree and strongly agree about a design that were we doing to design of printing machine.So, there are good number of respondents (60) representing agree at 55.56% and (29) respondents were strongly agree at 26.85%.It also have (5) respondents was disagree to design that we had made for a design of printing machine.

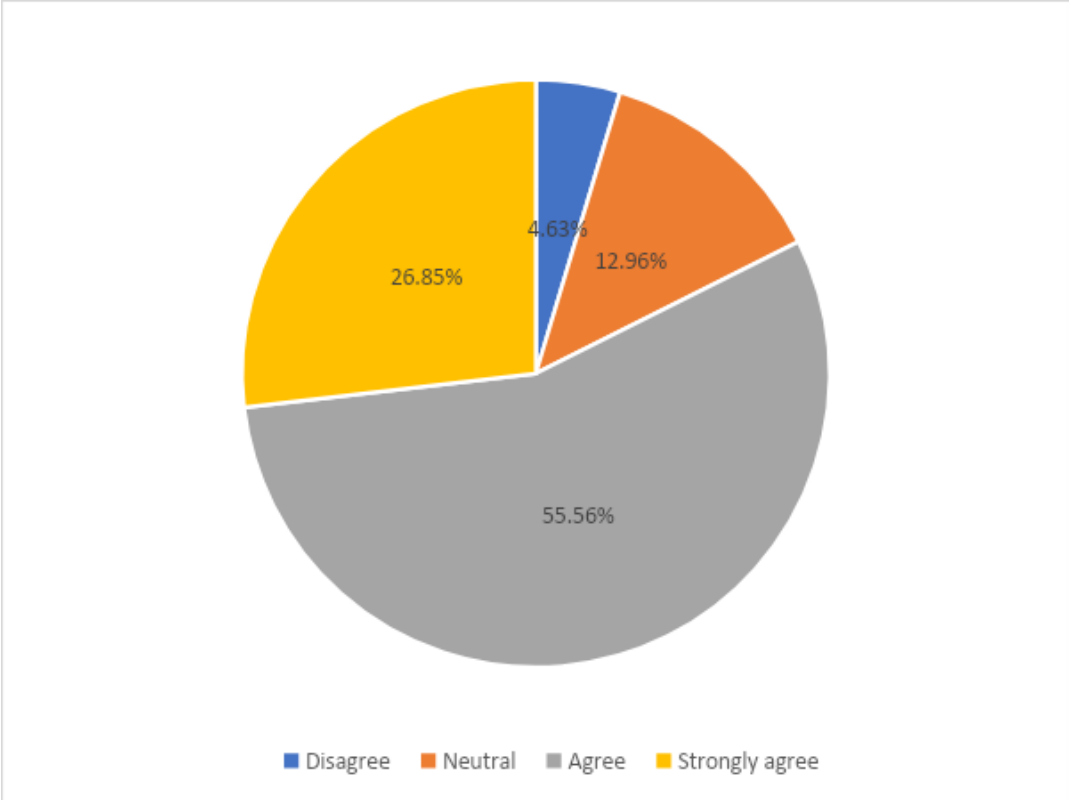


Chart 4.3.6 : *Responses the design of printing machine*

Responses	Frequency	Percentage (%)
Strongly disagree	0	0.0
Disagree	5	4.63
Neutral	14	12.96
Agree	60	55.56

Strongly agree	29	26.85
Total	**108**	**100**

Table 4.3.6 : *Responses the design of printing machine*

4.3.7 How many people who afford to buy a printing machine?

Chart 4.3.7 below presents there are many respondents was totally disagree.So, there have (70) respondents represents not afford to buy printing machine because that were expensive

at 64.81%.Other than that, that also had (38) respondants who can afford to buy a printing machine at 35.19%.

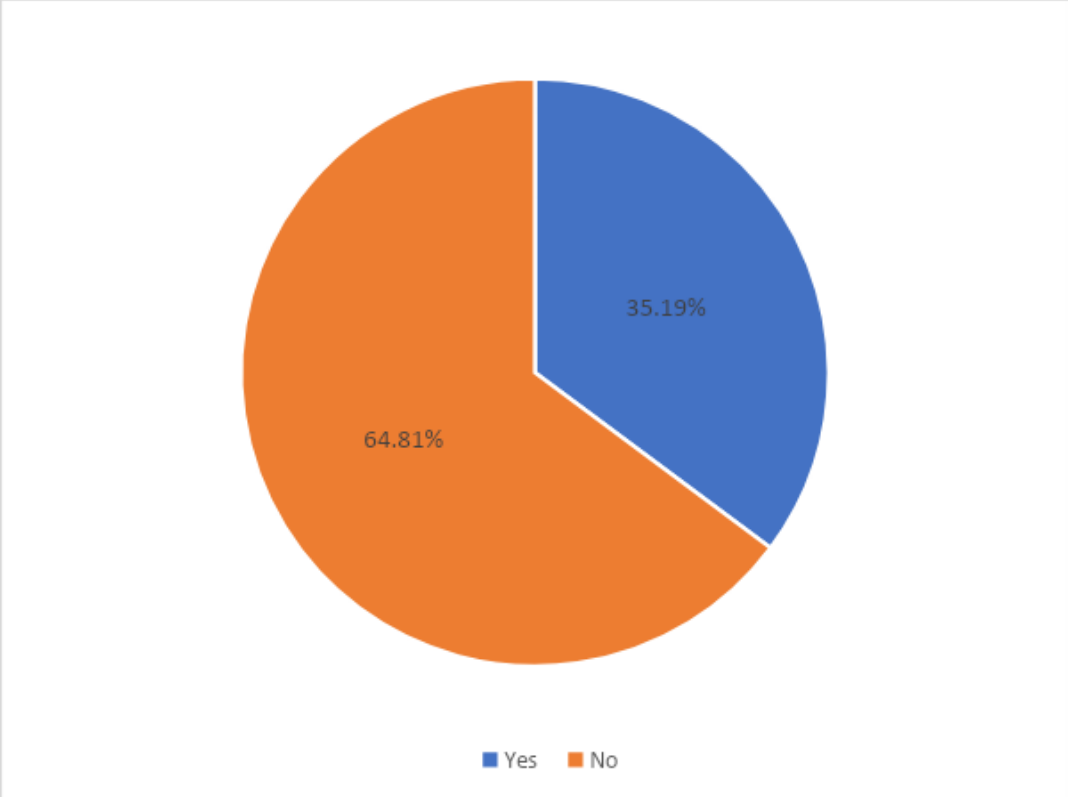


Chart 4.3.7 : *How many people who afford to buy a printing machine?*

Responses	Frequency	Percentage (%)
No	70	64.81
Yes	38	35.19

Total	**108**	**100**

Table 4.3.7 : *How many people who afford to buy a printing machine?*

4.4 Test Run

1. Test Run 1

We had conducted a test running on the printing machine and using by hand.So,as we can see the time taken by printing machine is faster than by using by hand.As we can see, figure ? the difference using printing machine and using by hands.

NO.	TYPE OF MODEL	ACTION	TOOLS	Time Taken	EFFECT OF ACTION
1	Using printing machine	Printing The t-shirt	Wooden stick thats stick at arm of printing machine	30 seconds	The finishing t-shirt was neat
2	Using by hand	Printing the t-shirt	Hand	45 seconds	The finishing t-shirt was not neat.

Observation:

The time taken of printing machine is slow because the mechanism that we put a wooden stick is not a right place.

2. Test Run 2

Finally,condition of Printing Machine are shown in Table 2.

NO.	TYPE OF MODEL	ACTION	TOOLS	Time Taken	EFFECT OF ACTION
1	Using printing machine	Printing The t-shirt	Wooden stick thats stick at arm of printing machine	15 seconds	The finishing of t-shirt is neat
2	Using by hand	Printing the t-shirt	Hand	45 seconds	The finishing t-shirt is not neat.

Observartion:

The printing machine is ready to be used perfectly and well.This printing machine is faster,neat print and friendly user than printing the t-shirt itself by hand.

Using by hand

Using printing machine

Figure 4.3 : *Finishing of printing using by hand and printing machine.*

4.5 Result

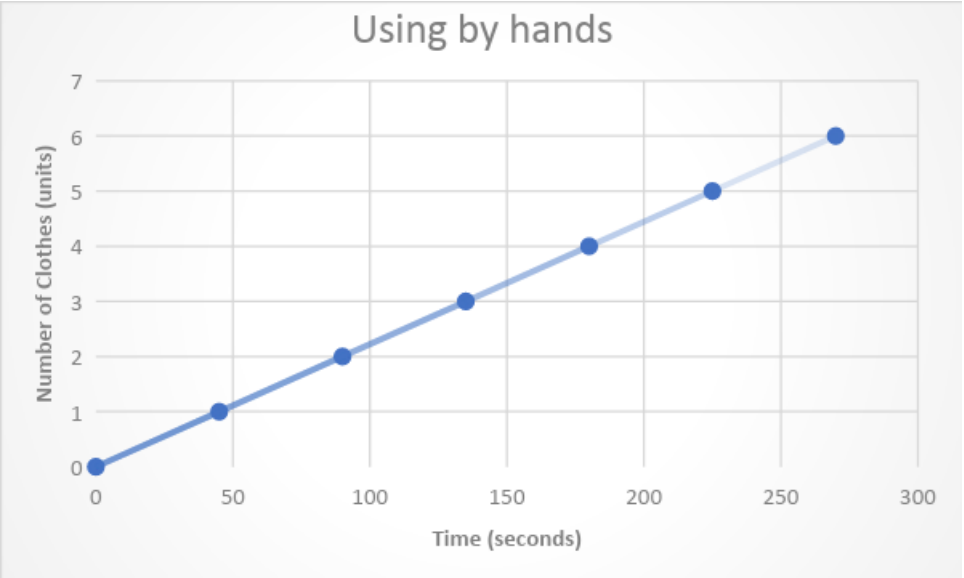


Chart 4.3.1 : *Result using by hand*

Chart 4.3 shows the number of shirts per unit can be printed by hand should take 45 seconds. In fact, we can see here that the more the number of shirts, the more time used. For example, in this diagram has proved if you want to print 2 t-shirts that has taken more than 45 seconds and will continue for the up next. In addition, anyone who uses this method of using by hands requires more time and more manpower. In addition, this method of using by hands can cause the quality and finishing of the printing t-shirts to be untidy and messy.

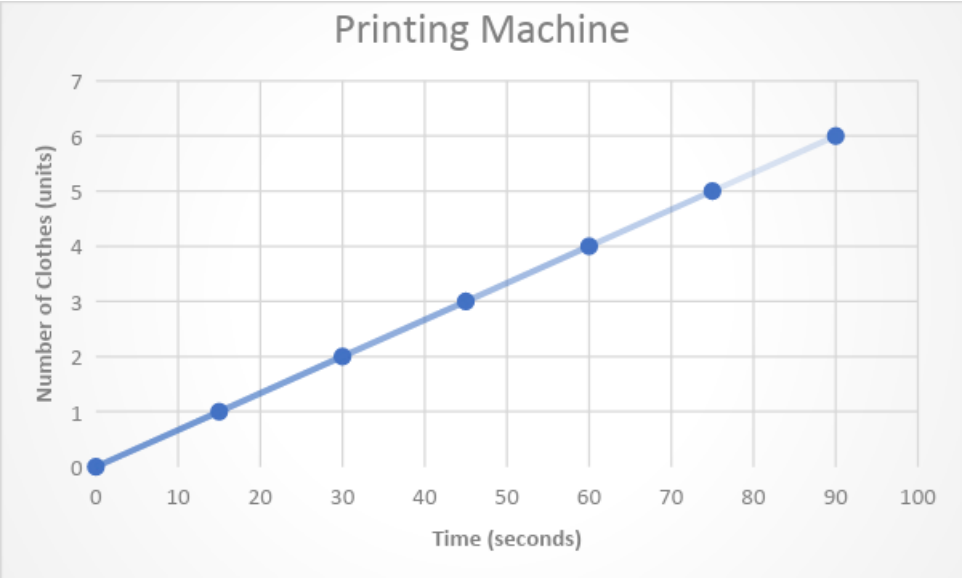


Chart 4.3.2 : *Result using printing machine*

The data in this chart 4.3 shows that a shirt can be printed using a machine that only takes 15 seconds. This has proven that the use of this printing machine can save the time. In addition, the method of using a printing machine can reduce manpower compared to those using hands. Next, the more the number of shirts, the more time used that a t-shirts of 2 printed t-shirts can be done in 30 seconds and it will continue in multiples. In addition, anyone who uses this printing machine will be guaranteed to get a neat t-shirt print result.

4.6 CHAPTER'S SUMMARY

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

CHAPTER 5

DISCUSSION , CONCLUSION AND UPGRADE PLAN

5.1 INTRODUCTION

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

5.2 DISCUSSION

In the early stages, our group used a motor that had a small volt but after we tested our project using the motor, it could not support the movement of the squeegee well. Therefore, we took the other option to convert this project to manual to be able to support the movement of the squeegee forward and backward to form an image on the shirt. It can also make it easier for us to use it because it does not use much energy extraction. Finally this machine can work well and can form the image on the shirt beautifully and neatly.

5.3 UPGRADE PLAN

This is some idea to upgrade this printing machine for to make it better :-

1. Future researchers should use a step-up motor to automate the printing mechanism so as to increase the speed of printing.
2. Material that have been used are strong and durable.

3. Printing machine have to connect with system and programming.

CONCLUSION

After all the discussions through data analysis, we can conclude that this project provides many benefits to the community, especially for the use of small buniness in printing. This project can help them solve problems easily and quickly. In addition, it also save time to do work in the place where they do clothing printing. Although this project requires more time and challenge but it can work quickly and smoothly. Hopefully this project will continue and upgrade for better goods.

The results of the experiments that have been conducted on this printing machine with other mechanical components such as a movement that have done by wooden stick that stick up together with squegee , can be concluded that Printing Machine has achieved the objective of the study which is to fabricate a machine that provides an ideal printing machine for users who are unable to prints their clothes. To investigate the survey from responded and identify the problem., build and innovate this machine that everyone can use it for small buniness and just for yourself.

Furthermore, now is the covid-19 pandemic season where the RMCO has been carried out causing our movement to be limited to finding more items to make this product more compact. Printing machine had successfully done.

REFFERENCES

[1]https://www.art2silkscreen.co.uk/?gclid=EAIaIQobChMI8eWd4OGB7AIVUXRgCh3-1gkyEAAYASAAEgJeX_D_BwE

[2]https://once-tech.com/cylindrical-screen-printing-machines/?gclid=EAIaIQobChMI8eWd4OGB7AIVUXRgCh3-1gkyEAAYAyAAEgJAOfD_BwE

[3]https://youtu.be/YxQaKGD4ihk

[4]https://www.google.com/search?ei=2I1sX_y_K9zfz7sPmNSE4AY&q=kesimpulan+yang+boleh+dibuat+berdasarkan+silkscreen+machine&oq=kesimpulan+yang+boleh+dibuat+berdasarkan+silkscreen+machine&gs_lcp=ChNtb2JpbGUtZ3dzLXdpei1zZXJwEAM6BAgAEEc6BAgeEApQ8n5Y7YACYPOEAmgAcAF4AIABtgKIAZQVkgEINS4xMi4yLjGYAQCgAQHIAQjAAQE&sclient=mobile-gws-wiz-serp

[5]https://www.google.com/amp/s/amridesignenterprise.wordpress.com/2013/10/08/mengenali-peralatan-bahan-cetakan-silk-screen-bahagian-1-3/amp

Appendix A

Survey Forms

Printing Machine

SECTION A : RESPONDENT DEMOGRAPHY

1. Gender :

( ) Male ( ) Female

2. Age :

( ) 15-25 ages

( ) 26-30 ages

( ) 31-40 ages

( ) 41 and above

3. Occupational :

( ) Students

( ) Employee

( ) Others

SECTION B : GENERAL VIEW OF THE STUDY

Please tick (√) your choice in the appropriate box based on the following scale.

Level of Approval	Scale
Strongly disagree	1
Disagree	2
Neutral	3
Agree	4
Strongly agree	5

1. Do you have a knowledges about printing machine?

( ) Yes ( ) No

2. Is a prices of printing machine was affordable for people to buy it?

( ) Yes ( ) No

No	Statement	1	2	3	4	5
3.	Screen Printing is one of the methods of printing t-shirt?					
4.	Can printing machine increased an income for people who want to start a small buniness?					
5.	Are u agree a design that we have done to our printing machine?					

APPENDIX B

Report Writing														
Video and Slide making														
PITEX preparations														
PITEX presentation														