

DEVELOPMENT OF APPLE PEELER MACHINE

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SUPERVISOR DECLARATION

“I declare that I have read this thesis and in my opinion, this thesis is enough to fulfill the purpose for the award for the Diploma of Mechanical Engineering from the aspects of scope and quality.”

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Date :

STUDENT DECLARATION

I declare that this report entitled "*Development of Apple Peeler Machine*" is the result of my own research except as cited in the references. The report has not been accepted for any degree and is not concurrently submitted in candidature of any other degree.

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Alhamdulillah, I would like to express my thankfulness to Allah s.w.t to giving me all the strength in fulfilling and completely this final year project. All the praise and blessing be upon Prophet Muhammad s.a.w. I would like to thank to those who had been involved whether directly or in directly in helping me to complete my final year project. It could not have been written and produced without the help of many people.

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ABSTRACT

The idea to create **an apple peeler machine** is come from supervisor that gives me this title and task for this project. To design and fabricated this apple peeler, it must be compare with other product that maybe available in the market. First, get an idea from internet, magazine, newspaper or other from available data. Form there the information and idea to design and fabricated can be created.

Whole project involves various methods such as collecting data, concept design and fabrication process. The whole project involved various method and process that usually use in engineering such as concept design, analysis process and lastly fabrication process.

This final year project takes one semester to complete. This project is individual project and must be done within this semester. In this project, students must able apply all knowledge during their studies in this Diploma of Mechanical Engineering course. Overall from this project, time management and discipline is important to make sure this project goes smooth as plan and done at correct time.

ABSTRAK

. Idea untuk menghasilkan **mesin pengupas epal** ini datang daripada penyelia yang memberi saya tajuk dan tugas untuk projek ini. Untuk merekabentuk pengupas epal, ia hendaklah dibandingkan dengan produk lain yang mungkin berada dalam pasaran. Langkah pertama, dapatkan maklumat daripada internet, majalah, suratkhbar atau daripada sumber yang lain.

Keseluruhan projek melibatkan pelbagai cara atau kaedah seperti mengumpulan data, rekabentuk konsep dan proses membina. Kaedah yang selalu yang digunakan dalam kejuruteraan seperti proses analisis juga digunakan.

Projek akhir tahun ini mengambil satu semester untuk disiapkan. Projek ini adalah projek individu dan mesti disiapkan dalam semester ini. Didalam projek ini, pelajar mesti berupaya menggunakan segala pengetahuan yang mereka perolehi semasa pembelajaran mereka di dalam kursus Diploma Kejuruteraan Mekanika ini. Secara keseluruhan daripada projek ini, pengurusan masa dan disiplin adalah penting dalam memastikan projek berjalan lancar dan siap tepat pada waktunya.

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CHAPTER 1

INTRODUCTION

1.1 Project Synopsis

This project contains of designing and fabrication of apple peeler machine. Apple peelers are basically kitchen utensils used to peel any kind of vegetable or fruit that needs peeling and their use is not restricted to apple. There have many differences between these apple peelers with current design in market place. In this project we have to develop and improving it performance as well so that there has no doubt about the design and concept. This design much more portable because it easy to carry together when to slice the apple. In this project, it needs lot of skills and information and also knowledge such as Computer Aided Design software (AutoCAD), Solid works 2005 software, using the Disc Cutter, Drilling and welding process. This design obviously would help peeling the skin off is also a better idea if you are feeding a baby or someone who has difficulty digesting food. An apple peeler is certainly an indispensable tool in the kitchen. So, this design would through many processes before it get into prototype from in order to achieve the objective and customer need as well.

1.2 Project Problem Statement

Nowadays to slice the apple by hand. This method is very dangerous because can make injure for us, but nowadays many apple peeler was produce. But most of the current product was no clutch. So the current product is not portable. Then the current products are troublesome and difficult because not hold and slow to slice. Beside that, most of products also not have to clamp to prepare and not have storage for the slices apple.

1.3 Project Objectives

Actually purpose of this project is to practice student to figure out problem using application using research and absolutely improving student skill and knowledge. This project also could train student as well before facing a real situation about producing product and then make student more independent in searching and expanding the experience and knowledge. So, objective of this project are;

1.3.1 The general objective of this project:

To design and fabricate the product based on mechanical design method.

1.3.2 Specific objective also included:

- a) To achieve the product based on customer need
- b) Exploring different simple machine
- c) Know to solve the problem that might be occurred
- d) Comparing different machine
- e) To provide and improved the product in market

1.4 Project Scope

In order to finish this project require precise scope of work and proper plan need to be followed because this project must through various process before it would be produce. These are scope of work in this project,

1) Literature review

Apple peeler and other kitchen appliances were among the first mass produced item. The only kind of apple peelers one sees today are called lathe type peelers, in which the apple is skewered on prongs, and spins as a stationary blade removes the peel, and a corer removes the core.

2) Concept Design

Draw 4 concept design idea of apple peeler and then show to the supervisor the design. Discuss with supervisor about 4 concept designed, identify the strength and weakness and will be choose the best criteria from 4 design concept.

3) Final concept

Get the best concept from the 4 design concept and the final concept re-draw again using SolidWork.

4) Fabricate

I will fabricate my product follow the final concept. Uses fabricate the product at the lab and appropriate the material to fabricate the product.

5) Report

After finished fabricate these project, I will prepared to make a report.

1.5 Project Schedule

Table 1.1: Gantt chart

Project Activities		Week														
		1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
Briefing about PTA by the lecturer	<i>Plan</i>	■														
	<i>Actual</i>	■														
Choose the Project that listed	<i>Plan</i>	■														
	<i>Actual</i>	■														
Project been given and start meet the supervisor	<i>Plan</i>	■														
	<i>Actual</i>	■														
Do some literature review and gather information	<i>Plan</i>	■	■													
	<i>Actual</i>	■	■													
Do the skethcing, gantt chart and solid work	<i>Plan</i>		■	■												
	<i>Actual</i>		■	■												
Start project	<i>Plan</i>			■	■											
	<i>Actual</i>			■	■											
Making progress report	<i>Plan</i>					■	■									
	<i>Actual</i>					■	■									
Show progress report to supervisor	<i>Plan</i>							■								
	<i>Actual</i>							■								
Present for work progress	<i>Plan</i>								■							
	<i>Actual</i>								■							
Continue project	<i>Plan</i>									■	■	■				
	<i>Actual</i>									■	■	■				
project complete and start final report	<i>Plan</i>												■	■	■	
	<i>Actual</i>												■	■	■	
Present the Final Year Project	<i>Plan</i>															■
	<i>Actual</i>															■

1.6 Project Planning

According to the Gantt chart, the project was started by briefing the final year project that is included the selected title of the project. After got the title, project briefing followed by collecting literature review. These include gathering raw data through internet, books, and others source. The literature review process is on week 1 and 2.

After that, this project was continued with idea generation on week 2 and sketch and design process on week 2 and 3. This is started with sketching four design of apple peeler and all design I identify the strength and weakness. The best concept that was being chosen and re-draw again using solid work software with actual dimension.

Materials to be used must be suitable and easy to get. The criteria when selected the material is includes strength, durability and others. This is important for fabrication process.

The fabrication was started after finish cutting material. This process consist fabrications to part that has been designed by follow the dimension using various type of manufacturing process. The manufacturing process is determined from a literature review. Evaluation stage has been implemented after fabrication stage. The evaluation is to consider the strength, durability, safety and workability of the apple peeler. If any problem occurs during the evaluation, modification will be done.

Next task is final report writing and final presentation preparation. The report is guided by UMP Thesis writing guided and also the guidance from my supervisor.

CHAPTER 2

LITERATURE REVIEW

2.1 Introduction

Apple peelers are basically kitchen utensils used to peel any kind of vegetable or fruit that needs peeling and their use is not restricted to apple. Apple peelers, or vegetable or fruit peelers, are metal blades attached to wooden or plastic handles. There are three varieties of apple peelers available today.

These are the Yorkshire, the Y-peeler, and the Dalson Classic Aussie peeler. The Yorkshire peeler is designed like the ordinary knife, with the blade attached to the wooden or plastic handle. The Y peeler, also called the Rex peeler, is used like a razor, where the skin strips are shaved off parallel to the handle. The Dalson peeler has a plastic handle that project upward to support a rotating blade.

The only thing that is needed to remember is that apple peelers should be used with the hands away from the blade, to avoid your skin from being peeled along with the vegetable. There have been many innovations in apple peelers since its invention. Now there are apple peelers that work by clamping on the vegetable or fruit to allow better manipulation while peeling. Other models feature carbon steel blades that do not need to be re-sharpened from time to time, equally comfortable for use by left-handed users as well as right-handers.

Some manufacturers offer peelers that are very light, easy to store, and can be carried anywhere. There are some peelers that are incorporated into more complicated food processors. Some peelers also commonly feature apple eye removers, to remove the eyes and other blemishes.

Some people might object to the habit of peeling everything in your kitchen. It is true that most fruits and vegetables are better off eaten unpeeled because sometimes only a good washing is needed, since most nutrients in some fruits or vegetables are retained in the skin. Peeling the skin off is also a better idea if you are feeding a baby or someone who has difficulty digesting food. At the end of the day, an apple peeler is certainly an indispensable tool in the kitchen.

2.2 Product Review

Study about the current design is important in order to determine what the product function really are and find out how it perform and getting out it advantages for each and then compare it with other product that been review already. In this process, we decided to study about three current designs in market now in order to gain information that could help me created the new design as well.

2.2.1 Matfer Apple Peeler



Figure 2.1: Matfer Apple Peeler

Advantages

- i. It dishwasher safe. Can be put under the tool to collect the core.
- ii. All made of composite plastic and stainless steel.
- iii. Simply turning the handle, it is capable of simultaneously peeling, coring and slicing each apple.

Disadvantages

- i. Material cost
- ii. It must not be left within reach of children.

2.2.2 Apple Slicer



Figure 2.2: Apple Slicer

Advantages

- i. By simply turning the handle.
- ii. Setting can change according to the variety and size of the apple.
- iii. Stability and strength to slice the apple.

Disadvantages

- i. Difficult to use.
- ii. Material cost.
- iii. Use only apples graded medium size, firm without bruises.

2.2.3 Apple Slicer 8 Scraps



Figure 2.3: Apple Slicer 8 Scraps

Advantages

- i. Product material is a pure metal.
- ii. Even 8 scraps and the synchronization have sliced among the apple fruit core.

Disadvantages

- i. Does not have the fruit core
- ii. Take for a long time to slice the apple

2.2.4 Ceramic Y Peeler



Figure 2.4: Ceramic Y Peeler

Advantages

- i. Product material is ceramic
- ii. A molded handle makes it easy to grip

Disadvantages

- i. Material cost.

2.3 Process in fabrication

This chapter is present about literature review of fabrication process such as welding, drilling, cutting and others. Before fabrication process, the material selection is crucial. The selection of joining is also important to get a product with better strength and durability.

2.3.1 Welding

Welding is a fabrication process that joins materials, usually metals or thermoplastics, by causing coalescence. This is often done by melting the work pieces and adding a filler material to form a pool of molten material that cools to become a strong joint, with pressure sometimes used in conjunction with heat, or by itself, to produce the weld. This is in contrast with soldering and brazing, which involve melting a lower-melting-point material between the work pieces to form a bond between them, without melting the work pieces. A weld occurs when pieces of metal are joined by causing the interface to melt and blend prior to solidifying as a uniform metal joint. This process may be caused by heat, pressure or a combination of both.

Pressure welding usually involves heating the surfaces to a plastic state and then forcing the metal together. The heating can be by electric current or by friction resulting from moving one surface relative to the other. The methods and equipment used for welding metal are also associated with cutting metal. There are a large number of welding and allied processes including the following.

2.3.2 Arc Welding (Shielded Metal Arc Welding)



Figure 2.5: Arc Welding

Electric Arc welding is based on providing an electric circuit comprising the Electric current source the feed and return path, the electrode and the work piece. The arc welding process involves the creation of a suitable small gap between the electrode and the work piece. When the circuit is made a large current flows and an arc is formed between the electrode and the work piece. The resulting high temperatures causing the work piece and the electrode to melt the electrode are consumable. It includes metal for the weld, a coating which burns off to form gases which shield the weld from the air and flux which combines with the nitrides and oxide generated at the weld. When the weld solidifies a crust is formed from the impurities created in the weld process (Slag). This is easily chipped away.

There are several work pieces material requirements for arc welding;

- a. Have a well defined melting point
- b. Must electrically conducting
- c. Have a reasonably high thermal conductivity

2.3.3 Metal Inert Gas Welding (Gas Metal Arc Welding)

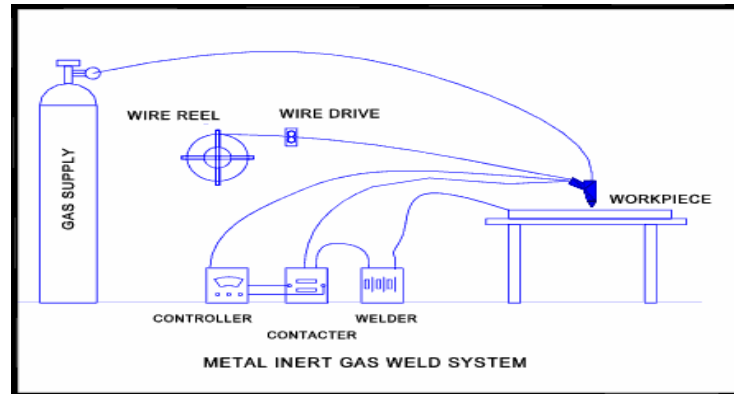


Figure2.6: Metal Inert Gas Welding

The Metal Inert Gas Process uses a consumable electrode of wire form and an inert gas shield of carbon dioxide when welding carbon steel. The wire electrode provides a continuous feed of filler metal allowing welds of any length without stopping. The inert gas shield eliminates slag and allows cleaner and stronger weld. This process is used widely for automated welding using robots. There are four primary methods of metal transfer in GMAW, called globular, short-circuiting, spray, and pulsed-spray, each of which has distinct properties and corresponding advantages and limitations.

2.3.4 Tungsten Inert Gas Welding (TIG)

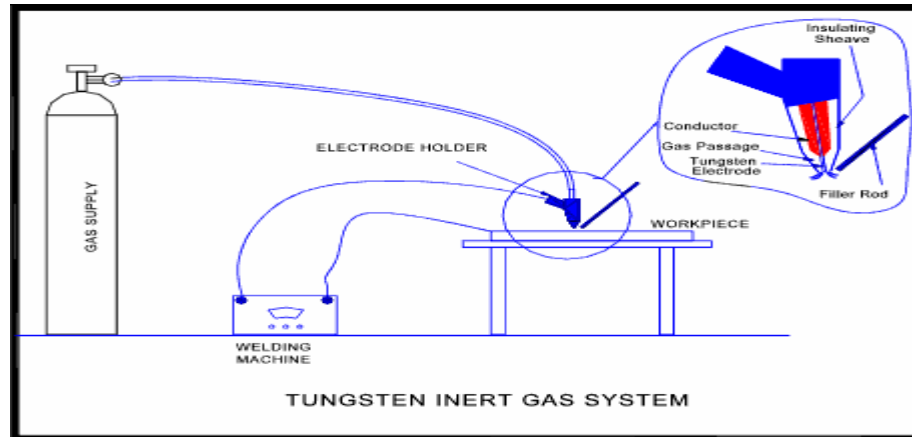


Figure2.7: Tungsten Inert Gas Welding

The Tungsten Inert gas (TIG) system uses a non-consumable electrode of tungsten and also provides an inert gas shield of argon or helium. This process was originally developed for welding magnesium and it is now used for welding aluminum, copper, stainless steel, and a wide range of other metals that are difficult to weld. Consumable rods may be used depending on the type of weld and the thickness of weld.

2.3.5 Drilling



Figure2.8: Drilling

A drill (from Dutch *Drillen*) is a tool with a rotating drill bit used for drilling holes in various materials. Drills are commonly used in woodworking, metalworking, and construction and DIY.

The drill bit is gripped by a chuck at one end of the drill, and is pressed against the target material and rotated. The tip of the drill bit does the work of cutting into the target material, either slicing off thin shavings (twist drills or auger bits), grinding off small particles (oil drilling), or crushing and removing pieces of the work piece (SDS masonry drill).

a) Drilling Process

A process and apparatus for drilling holes in hard materials in surgical procedures, comprising driving a drilling tool with a movement of alternating rotation with amplitude of less than one revolution. The tool can be driven from a motor having unidirectional continuous rot table movement through a converter which transforms this movement into the alternating rotation. The drilling tool can cover by a member which feeds the waste cutting materials rearward into an enclosed chamber. The apparatus can also be provided with a member that covers the drill during an insertion thereof through cut tissue prior to the drilling operation.

b) Type of Drill

There are many types of drills: some powered manually, others using electricity or compressed air as the motive power, and a minority driven by an internal combustion engine (for example, earth drilling augers). Drills with a percussive action (such as hammer drills, jackhammers or pneumatic drills) are usually used in hard materials such as masonry (brick, concrete and stone) or rock. Drilling rigs are used to bore holes in the earth to obtain water or oil. Oil well, water well, or holes for geothermal heating are created with large drill rigs up to a hundred feet high. Some types of hand-held drills are also used to drive screws. Some small appliances may be drill-powered, such as small pumps, grinders, etc.

2.3.6 Disc Cutter



Figure 2.9: Disc Cutter

The present invention relates to a disc cutter machine, in particular for cutting sugar beet, comprising a machine frame, a disc cutter having a flat upper side and uniformly distributed passages for the cut product preferably longitudinal and extending in the radial direction, blade receivers arranged in the region of the passages, and a bearing and a drive for the disc cutter. In disc cutter machines of the known type, the disc cutters usually consist of a steel plate from which rectangular sections are removed to form the passages for the cut product. In the passages, the blade receivers are inserted which carry the blades for the cutting process. As a result of the displacement of the bearing from the region of the center of the cutting disc moreover space is made available across the cutting disc for the drive as a result of which the constructional height is reduced.

2.3.7 T-JAW Vertical Band Saw



Figure 2.10: Vertical Band Saw

In known vertical band saws of this kind the axes of rotation of the runner wheels preferably have an inclination of 45.degree. In relation to the cutting plane, to which there should however is no limitation. Furthermore, as a rule clamping means for the material are provided, which for the secure retention of the material are arranged preferably on both sides of the cutting plane. The known vertical band saws enable the material to be sawn to be severed in an arrangement of the cutting plane normal to the direction of feed of the material. Miter cuts, in which the cutting plane is pivoted in relation to the feed direction of the material, are not, however, possible in this case. Known vertical band saws with a work bench of the machine frame not provided with clamping means do permit freehand sawing to a certain extent wherein the material piece to be machined is fed by hand at an appropriate angle to the cutting plane formed by the saw band.

2.3.8 Lathe Machine



Figure 2.11: Lathe Machine

The lathe machine uses a single-point-cutting tool for a variety of turning, facing, and drilling jobs. Excess metal is removed by rotating the work piece over the fixed cutting tool to form straight or tapered cylindrical shapes, grooves, shoulders and screw threads. It can also be used for facing flat surfaces on the ends of cylindrical parts.

The work piece is clamped onto a horizontal rotating shaft by a 3-jaw or 4-jaw chuck. The latter chuck can be used to cut off-centered cylinders. The rotating horizontal spindle to which the chuck is attached is usually driven at speeds that can be varied.

The cutting tool is fixed onto a tool rest and manipulated by hand. It can also be power driven on straight paths parallel or perpendicular to the work axis. This is useful for screw cutting. Internal turning known as results in the enlargement of an already existing hole. The holes are more accurate in roundness, concentricity, and parallelism than drilled holes. A hole is bored with a single-point-cutting tool that feeds along the inside of the work piece.

CHAPTER 3

METHODOLOGY

3.1 Introduction

In this chapter will discuss about steps that we need to follow in completing final year project. In fabrication process, there is a planning of the overall progress to make sure the project can be finished on schedule. Beside that, this chapter also represent about methods and machining process that will be used to make the apple peeler.

3.1.1 Project Flow Chart

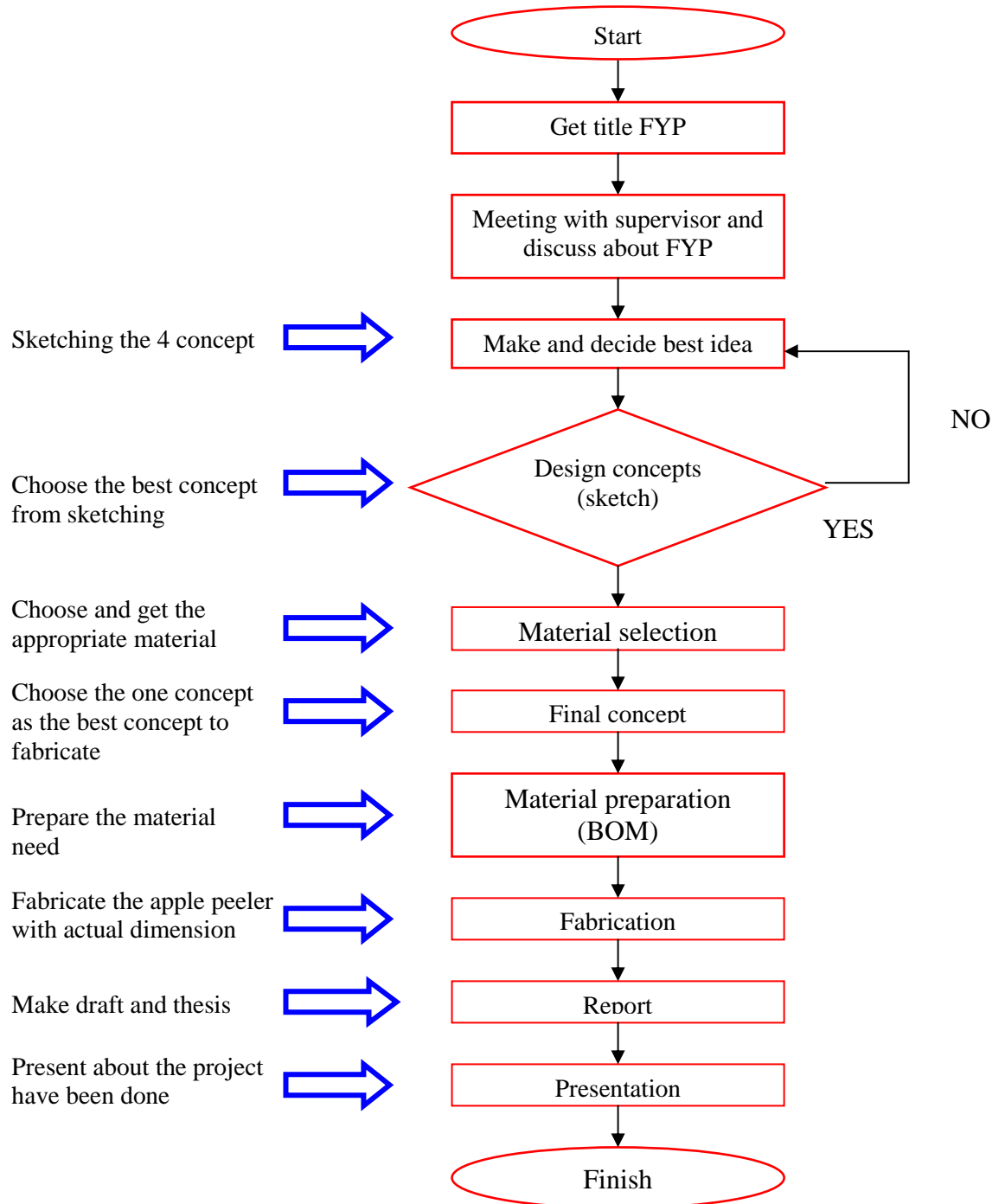


Figure 3.1: Flow chart

From the flow chart above, this project was started on discussion with supervisor about the title had been given before. This discussion covering project overview supervisor and throw out opinion that related about title and supervisor instruct to proposed a certain design and concept before go up to the next step.

Then start to make and decide the best idea about the title. Before that, literature review and research about title are the important point to get the best idea. Then study and make a lot of investigation about apple peeler. This includes a study about concept of apple peeler, process to fabricate, and material. These tasks have been done through study on the internet, books, and others information.

After gathered and collected all related information and obtain new idea and knowledge about the title, the project would continue with the design process. In this stage, the knowledge and idea should throw out in sketching process. After several designs had sketched, the best design would be choose among previous design so that we could carry on designing process. Then the selected design would be transfer to the engineering drawing using Solid Work software in order to improve it capability and for analysis process.

After that material preparation which is has been confirm initially. Purpose of this process is a to determine the suitable and strength material follow the product and design requirement. This process covering purchased material, measuring material and cutting off based on requirement. Here, this process is important because the material would determine whether our product in way to failure or otherwise.

After all the drawing and material preparation had been done the next process is a fabrication process. This process based on dimension has been determined from drawing. During this process, all the manufacturing process which is suitable could be used such as drilling process, thread using lathe machine, welding process and cutting material using disc cutter.

Analysis stage has been implemented after fabrication stage. The evaluation is by considering the strength, portable, durability, safety and others.

After all process above done on schedule without any problem such as product malfunction or product brittleness, all material for report writing is gathered. The report writing process covering and including all manners from week 2 until finished. This process also included the presentation for final presentation of the project.

3.2 Design and Drawing

This design will explain about the design and drawing that had been chosen to be as the final idea to be produced or fabricate. All the design process in this project is going to be explained in details.

3.2.1 Design

The design of apple peeler must have based on much aspect actually. The design consideration must be done carefully and efficiency so that the design can be fabricate easily and the system functioning. Then the material used in each design influence the selection thing because absolutely we need a lightweight material suitable with product size. The design is separated into three phases, firstly choose as many proposed design can be produce then choose 4 designs and try to improve it functionality and the last one is a new design with detail thing including dimension by using Solid Work software. Beside that the cost to design and fabricate must reasonable mustn't exceeded the budget given try to reduce waste .The criteria that must be considered in designing the apple peeler are:

- i. Durability: The apple peeler must be durable when slice the apple.
- ii. Material : The material that will be used must be suitable to fabricate the Apple peeler and easy to get.
- iii. Cost : It depends on material and manufacturing processes. It should reduce the cost to the minimum.