

DESIGN AND FABRICATION OF SILICON GLUE GUN

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Thesis submitted in fulfillment of the requirements  
for the award of the Diploma in Mechanical Engineering

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### **SUPERVISOR'S DECLARATION**

I hereby declare that I have checked this thesis and in my opinion, this thesis is adequate in terms of scope and quality for the award of the Diploma in Mechanical Engineering.

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Date :

## **STUDENT DECLARATION**

I hereby declare that the work in this thesis is my own except for quotations and summaries which have been duly acknowledged. The thesis has not been accepted for any degree and is not concurrently submitted for award of other degree.

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**This report is dedicated to my parents, for their *doa* and love;  
without them, my pursue to higher education would not have been possible  
and I would not have a chance to study and finally  
complete this mechanical course.**

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## **ABSTRACT**

The objective of this project is to design and fabricate silicon glue gun for student use at Fluid Mechanic Laboratory in University Malaysia Pahang. The main problem with the current silicon glue gun unit available is they easily hardened due to inappropriate action taken by students after each use such as use plastic to cover the nozzle after usage. The purchase of silicon glue gun by the faculty is in the big unit for the restoration purpose by lab technician which can last long for two to three month for the normal use in the lab due to economical reason. This resulted in wastage of product and extra spending in purchase new units. There are three stage involves in this project. The first stage is design or sketches few concept of the advantage of silicon glue gun. Second stage is selecting the best concept design and the last stage is fabricating the selected design of silicon glue gun. The fabrication process involves are marking, cutting, drilling, riveting, assembling and finally spraying for the final touch. As a result, project objectives have been achieved. This product may less a wasted during a maintenance work and give more benefit to the instructor.

## ABSTRAK

Objektif projek ini ialah merekabentuk dan menghasilkan pistol gam silikon untuk kegunaan pelajar di Fluid Mechanic Laboratory di Universiti Malaysia Pahang. Masalah utama dengan unit yang sedia ada ialah unit itu cepat mengeras disebabkan oleh tindakan yang tidak sesuai digunakan oleh para pelajar selepas digunakan seperti menggunakan plastik untuk menutup muncung selepas digunakan. Pembelian pistol gam silikon oleh pihak fakulti adalah dalam unit yang besar yang boleh digunakan untuk dua hingga tiga bulan untuk kegunaan pihak makmal untuk tujuan pembaikan di dalam makmal di atas faktor ekonomi. Ini menyebabkan pembaziran dan penambahan dalam kos disebabkan oleh pembelian unit yang baru. Projek ini terbahagi kepada tiga peringkat. Peringkat pertama ialah merekabentuk beberapa konsep pistol gam silikon. Peringkat kedua ialah memilih konsep yang terbaik dan peringkat terakhir ialah membentuk mengikut rekabentuk yang dipilih. Proses pembentukan termasuklah menanda, memotong, menebuk, merivet, menyambung dan seterusnya menyembur.

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# **CHAPTER 1**

## **INTRODUCTION**

### **1.1 INTRODUCTION**

Any type of metal that requires adhesive material in order to bond different pieces together can benefit greatly from silicon glue. Commonly, silicon glue will bond quickly, but can be applied with precision, allowing user to create the most delicate and intricate metal easily and with minimal mess. In the same way, any repairs that require the bonding of two items can be quickly completed with glue.

In addition, silicon glue also provides a strong bond that ensures the quality of prepared part and component. Silicon basically strong and durable, the bonding result of the silicon allows great sealing facility while attaching pieces together.

Glues are used in school project, manufacturing, shipping rooms and construction. This is available in the familiar clear stick form, but it's also come in a variety shapes, sizes and colors. Some glue sticks are multifunctional and can be used with any glue at any temperature, but others are intended for use at only one temperature.

## **1.2 PROBLEM STATEMENT**

In a fluid laboratory of mechanical engineering at University Malaysia Pahang, the silicon glue had been applied during repair of some leakage in the lab. This is due to the working problems that commonly happen in the tap or sinks of these workbenches. If a tank in the lab got leakage frequently, the silicon glue gun has to be used frequently. Since the lab has been used by students for their experiments so this is may the reason why the glue gun has been always used.

Commonly, the usages of a silicon glue gun in maintenance work fluid lab involve only a small quantity of glue. Faculty of mechanical engineering did not buy a small tube of the silicon glue gun. By buying a small tube of glue gun, the faculty may get a disadvantage since the price for large quantity small of glue gun will increase the cost. Using a large size of glue its most effective since did not have to buy many times and large glue gun its can be sustained for one or 2 months

Next is the used silicon glue being wasted since the balance of silicon becomes hard because there is no proper cover for this type of tube.

## **1.3 OBJECTIVE**

Based on the problem statement that mentioned previously, to overcome this problem the objective of this project must be achieved. This objective of this project is to fabricate and design silicone glue gun.

## **1.4 SCOPE**

Done with objective, next is determining the scope of this project. The scope is to ensure the project is on the boundary. Firstly is doing a benchmarking. This is focusing on the silicon glue gun that can only use for maintenance work.

Next is a design concept. Which means the 3 design concepts must be created without using a big cost. The 3 design concepts with different advantage and disadvantage is being chosen and come out with the final concept.

Lastly is a fabrication. This is all the criteria in final design must be fulfilled. For this 3 design concept based on the problem statement, the design must put a cover and indicator for the final design.

## **1.5 PROJECT FLOW**

Figure 1.1 shows the flow chart of this project



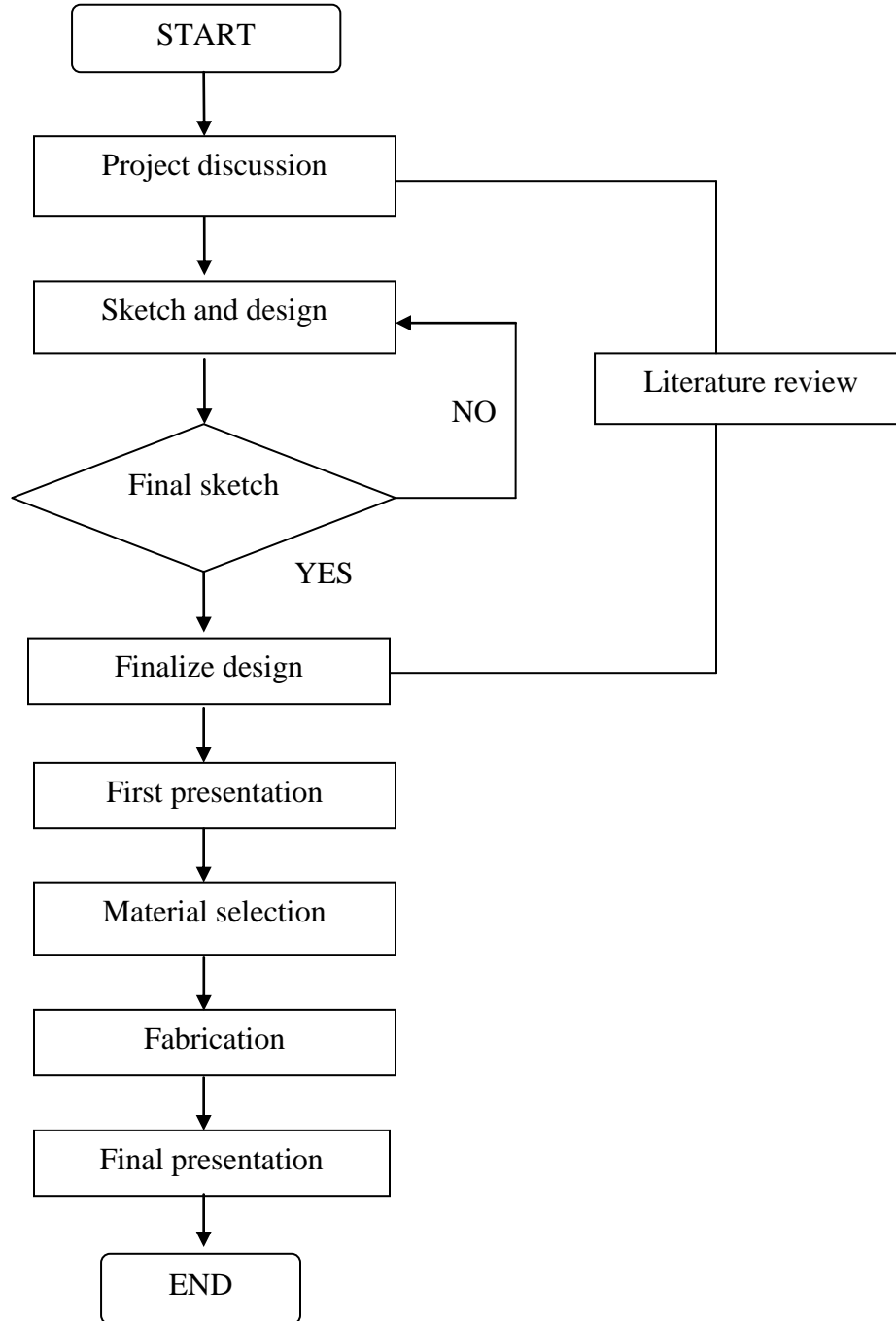


Figure 1.1 Project Flow Chart

The project started with making a research and literature review. It is from internet, magazines, public areas and my supervisor that related to my project. All of this literature review takes about eight weeks. This literature review concludes with objective, scopes and problem identification for this project. A also made a schedule management or Gantt chart for my project.

After gathering all the information, the project will proceed with the design process. To generate idea, firstly make a research from the internet which is more design and example that will refer to. The final design will be chosen by sketching three design concepts. For this final design, this best idea will be chosen for a PTA project after discussing with the supervisor. This sketching takes about 3 weeks to be done.

This selected final design sketched is then transferred to drawing by using Solid work program that has full dimension.

The next task is preparation for progress presentation and mid presentation this task has to be done in one week. The presentation which is to evaluate our proposed project has to be done at week 8. On this week, the slide for presentation has to be prepared. Thus, before proceed with the presentation this slide has to be approved by the supervisor.

Done this presentation, the fabrication process is started on week 9. Firstly, come out all the list material that has to use in the fabrication process. After list all the needed material, there are only a few materials that need to buy such as a screw, and gun rod. Other than this, the materials are already provided by the university.

After gathering all of materials that will be used, the project will proceed with the fabrication process. The drawing and sketching has to be used as a reference by following the measurement and the type of material needed. The fabrication process that involved is cutting, drilling, milling, and others. After all the parts have been processed, now it's the

time to assemble all the parts. The experiment and test the operation of the mechanism of the silicon glue gun must be done.

Next the preparation of final presentation has to be prepared. This presentation concludes of 30% of this final project.

Lastly, the final report or thesis has written and prepared. A report is guided by the UMP thesis format and also guidance from supervisor. All tasks scheduled takes around fourteen weeks to complete.

## CHAPTER 2

### LITERATURE REVIEW

#### 2.1 BENCHMARKING

Benchmarking is a process of identifying the best product. This is typically to measure a quality of the product and cost. Next is to compare the product with other product and analyze the existing product. The objective of the benchmarking is to understand and evaluate the product in the market.

##### 2.1.1 Waterproof silicone sealants in a caulk gun



Figure 2.1 waterproof silicone sealant in a caulk gun

The advantage of caulking gun is gunning caulking and caulk. It's widely used in the door or aluminum. This is used to prevent leakage of water as well. In addition, the

automotive industry, it also takes a shot along the edge of the glass front and rear of vehicles is water, wind as well. The advantage of caulk gun is waterproof up to 100% which is when the silicon being applied on sink or tub the silicon is not absorbed by water.

This disadvantage of this caulk gun is type of glue is dry, it may require time in days or two days for the glue to dry for maximum traction. Since the silicon did not have a proper casing so the glue is exposed to the environment. Other than that, the big force is needed to press the grip. The grip of this glue gun is provided with a big gap to press the grip, so the big force is needed when operate this product.

The mechanism when operate this product is first of all, hold the gun with 45 degrees between the object and the gun. Then squeeze the grip of the gun, and the glue will turn out. Its more effective since the glue gun will turn out smoothly and more tidiness.

### 2.1.2 Electric glue gun



Figure 2.2 Show that electric glue gun

The advantage of electric glue gun is this product provided indicator. While this product in be operating, user will be wondering either this glue is still available. So, with this indicator the problem will be solved. It's also easy to operate, since electric current will give some energy and force to simplify the operation.

This disadvantage of this product is electric is needed so the user has to charge before use, so it may will waste the time.

Since this product have to charge before use, so the electric current is needed while operating this product. Then press the button and the glue will automatically turn out. The press button is provided with the motor so is helped to squeeze the glue gun.

### 2.1.3 12ml curved tip syringe.



Figure 2.3 shows that 12ml curved tip syringe

The advantage of this product is easy to operate. Since the size of syringe is small so it's easy to operate. This is an economical solution for injection the casting resins into small intricate.

The disadvantage is the product is low durability based on material use. The material used is plastic which is in a long term the product will decompose. Besides, just little glue gun will use in one time. It is because smaller sizes and the amount of glue gun that can fulfill the syringe.

To operate the syringe is pressed the bottom of the syringe with a small forces until the glue gun is come out. This product just can be use into a small intricate area.

## **2.2 DESIGN CRITERIA**

On this subtopic the design criteria must be highlighted to achieve the objective of this project. The ideas with the better perspective are being created to ensure the design is to be more effective and relevant. Firstly, the design criteria of this project is provide a casing which is can close the nozzle of the tube glue gun. This result shows the wasted of the glue gun will be reduce. Next is, at the rod to squeeze the silicone glue is create an indicator. This indicator is helped during a maintenances work while it can be a reference while the glue becomes run out.

## **2.3 FABRICATION METHOD**

### **2.3.1 Cutting Process**

Cutting processes are those in which a piece of sheet metal is separated by applying a great enough force to cause the material to fail. The most common cutting processes are performed by applying a shearing force, and are therefore sometimes referred to as shearing process. When a great enough shearing force is applied, the shear stress in the material will exceed the ultimate shear strength and the material will fail and separate at the cut location. This shearing force is applied by two tools, one above and one below the sheet. Whether these tools are a punch and die or upper and lower blades, the tool above the sheet delivers a quick downward blow to the sheet metal that rests over the lower tool

There are many types of the cutting process, which is cut round duct, straight cuts and cut circles. Lastly, when do cutting processes please be aware with the sheet metal edges because of razor sharp. For the safety, always wear leather or other sturdy gloves when handling this sheet metal.



Figure 2.4 shows cutting process by using shear cutting machine

### 2.3.2 Rivet Process

A rivet is an easy process, economical and permanent way to bind two or more sheets of metal together. The original rivet head is called the factory head, and the secondary head made after popping sound is called the shop head or the buck-tail. Keep in mind that pop rivets are not a permanent solution, but this is will keep the metal in place long enough to add a permanent solution. This is some of instruction to do riveting process. Firstly is choosing the appropriate rivet size and capacity for project, for example 1/8-inch diameter and 1/2- inch capacity. Next is drill a 1/8 inch hole through one or more sheets of metal that need to be riveted and insert a rivet into the hole. Place the rivet stem into the riveting tool. Pump the tool handle until the rivet ‘pops’. Lastly, remove the rivet stem from the rivet and the riveting tool.





Figure 2.5 shows a rivet tool



Figure 2.6 shows the method by using a rivet process

### 2.3.3 Drilling Process

Drilling is the most common machining process whereby the operation involves making round holes in metallic and nonmetallic materials. Approximately 75% of all metal-cutting process is of the drilling operation.

Drilling usually has a length to diameter ratio that is capable of producing deep hole, however due to its flexibility, necessary precaution need to be taken to maintain accuracy and prevent drill from breaking.

During the operation chips that are produced within the work piece must exit through the flutes to the outside of the tool.

Normally, holes produced by drilling are bigger than the drill diameter and depending on its applications.

There are many types of drills step drills, core drills, counter boring & countersinking, center drill, spot drill, spade drill, crankshaft drill, gun drilling, trepanning and lastly twist drills.

In a standard drilling operation, the following steps are taken. Firstly, the work piece is marked with a center punch at the center of the hole to be drilled. It is then held firmly in a vice or other suitable clamping device and placed on the table of the drilling machine. The socket containing the drill is fitted in the machine spindle. Next the spindle is lowered by the hand lever and it is ensured that the point of the drill is in exact alignment with the previously marked center of the hole. The motor is now started and the rotating drill is gradually pressed into the work piece to produce the desired hole. The pressure should be frequently relieved during the drilling operations, otherwise the cutting edges of the drill will be strained and the drill is damaged. Lastly, in order to avoid spoiling the cutting edge of the drill, coolant such as oil or soapy water should be used constantly during the drilling operation.



Figure 2.7 shows a drilling machine

#### 2.3.4 Fastening

Sometimes it can be hard to figure out how nuts and bolts go together. Here's how to work the right way to fasten and loosen them

Firstly hold the nut against the bolt and turn the nut/bolt to the left. If feel a jump between the two and also hear a click as the threads jump over each other then have a common right hand thread. Turning the nut clockwise after the jump will reduce the risk of cross-threading.

Next it does not feel anything, reverse direction. Sometimes bolts, nuts and especially drain cocks are left-handed thread and need to be turned counterclockwise to tighten.

Lastly, Break tight nuts or bolts by tightening them and 1/8 of a turn to the right (assuming a right hand thread). It will help to break the corrosion.



Figure 2.8 shows a bolt and nut tools

### 2.3.5 Milling Process

Milling is the most common form of machining, a material removal process, which can create a variety of features on a part by cutting away the unwanted material. The milling process requires a milling machine, work piece, fixture and cutter. The work piece is a piece of pre-shaped material that is secured to the fixture, which itself is attached to a platform inside the milling machine. The cutter is a cutting tool with sharp teeth that is also secured in the milling machine and rotates at high speeds. By feeding the work piece into the rotating cutter, material is cut away from this work piece in the form of small chips to create the desired shape.

Milling is typically used to produce parts that are not axially symmetric and have many features, such as holes, slots, pockets, and even three dimensional surface contours. Parts that are fabricated completely through milling often include components that are used in limited quantities, perhaps for prototypes, such as custom designed fasteners or brackets. Another application of milling is the fabrication of tooling for other processes. For example, three-dimensional molds are typically milled. Milling is also commonly used as a secondary process to add or refine features on parts that were manufactured using a different process. Due to the high tolerances and surface finishes that milling can

offer, it is ideal for adding precision features of a part whose basic shape has already been formed.



Figure 2.9 shows the milling machine

## **CHAPTER 3**

### **DESIGN**

#### **3.1 INTRODUCTION**

At the design stage, the silicon glue gun needs to undergo a several design aspects and the compliance of design needs to follow step by step. It has also concluded the 3 design concept that had been chosen to be as final idealistic to be producing or fabricate.

#### **3.2 DESIGN**

Before proceeding with fabrication method such as rivets, milling process, cutting process and drilling process, the selection must be done with carefully and properly to ensure the product is can be applied in fabrication stage and the system are been functioning. Designing the product needs to consider a several aspect, such as concept of design, design criteria, material, strength of material, and cost of the whole product. To determine the concept of design, it's necessary to make sure the design can be used and have suitable force to the frame and grip well together. The material of the frame must be having a light weight. So the product will handle comfortably. The material available can be used depending on their purpose. The cost of the whole material used must be not exceeded budget given and must be reasonable. Since this product has a less material used, so its advantage to reduce a cost.

### 3.3 DESIGN CONCEPT

There are 3 design concepts in this project. Each concept provided with an advantage, disadvantage and the mechanism while operate this project.

#### 3.3.1 Concept A

Figure 3.1 shows the concept A. The advantage of this concept is using less material. Since the university just provide a small quantity of material. The design on concept A is simple compared that concept B and C. Then it provide in small size.

Next the disadvantage of this concept is big force needed while to squeeze the glue gun. Since the higher viscosity of the glue gun so it may take time for the movement of silicone glue. Also this silicone glue may waste the time since just a little glue has to use in one time.

The functionality of this product is by pressing the rod of the glue gun, while the silicon glue gun will turn out. The features of this product provided with the full cover of aluminum to cover of the silicon glue gun. Also provide with the rod to squeeze the glue gun.

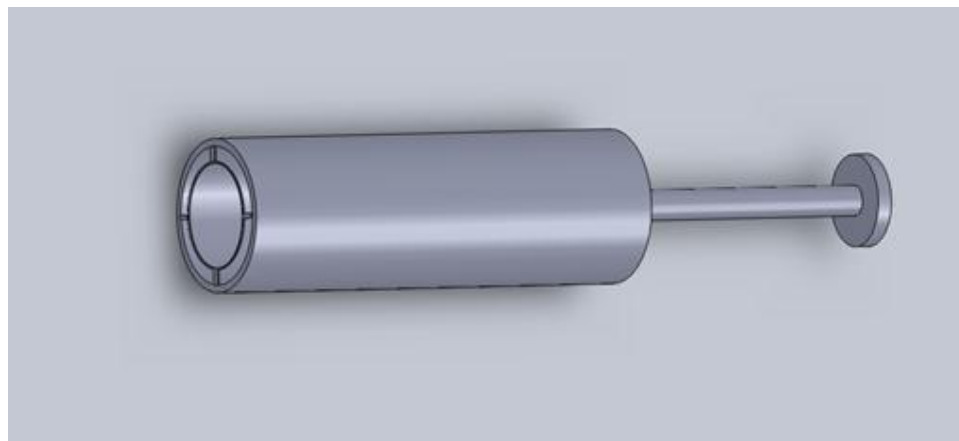


Figure 3.1 Concept A

### 3.3.2 Concept B

Figure 3.2 shows the concept B. In this concept the design and the mechanism are better than concept A. The advantage of this concept is strong. This product will be fabricated by using the mild steel since this material is required with high durability.

This disadvantage didn't have an indicator, so by creating an indicator at a final design perhaps it can be used for as reference when the glue gun is running out. Also big force needed when to apply this glue gun. The customers need to squeeze the gun since the silicone is provided with high viscosity.

The mechanism of this concept is hold 45 degrees from the surface and grips the gun until the gun turn out. The features of this product are provided with the complex design, so it will more attractive. Also the spring is helped to press the silicone glue gun and the force to press the gun will be reduced.

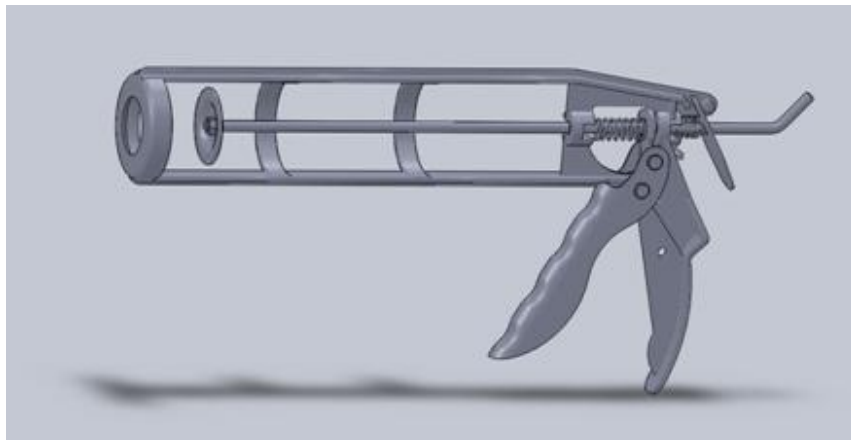


Figure 3.2 Concept B



### 3.3.3 Concept C

Figure 3.3 shows the concept C, in this concept the advantage is this product is easy to operate. The inside of this product is provided with air force so the force requires pressing the glue gun is small. This product uses a plastic material so it's light weight.

The disadvantage is easy to break since have a lower durability. Which is the material of this product is from plastic, so once its fall it may be broken.

The mechanism of this concept is either press the grip or push the force at the pump. The air inside the design is giving a force to turn out the glue gun.

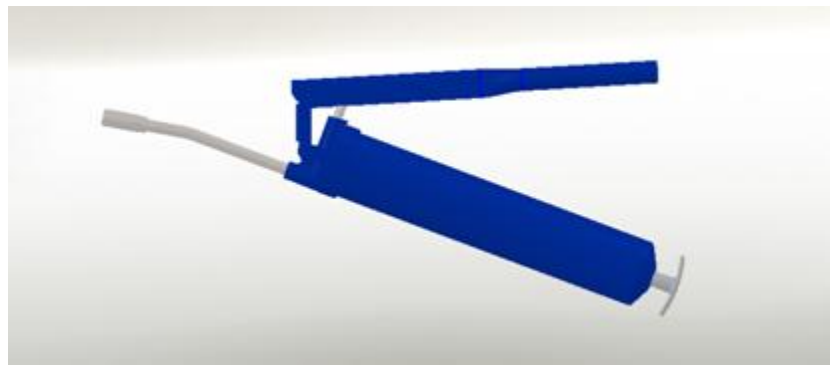


Figure 3.3 concept C

### 3.4 CONCEPT SELECTION

To choose the best concept among these three concepts, the concept selection was done. This is to ensure the chosen concept is more accurate and less weakness. Table 3.4 shows the concept selection

Table 3.4 concept selection

NO	CRITERIA	CONCEPT		
		A	B	C
1	EASY TO USE	-	O	-
2	SIMPLE	+	+	-
3	SIZE	+	+	+
4	EASY TO FABRICATE	+	-	-
5	STRONG	O	+	O
6	USE LESS MATERIAL	-	-	O
	PLUS	3	3	1
	SAME	1	1	1
	MINUS	0	4	4
	NET	0	3	1
	RANKING	1	1	2
	FABRICATE	NO	YES	NO

Note:

- + Better than
- Worse than
- 0 same as

For this concept selection all this criteria have been determined. Based on these criteria, the best concept among these 3 concepts is being selected. The “+” symbols are referring to better than which is this concept is can be proceed. Next the “-“symbols is referring to worse than which is the criteria is not suited with this criteria. Lastly, the 0 symbols is represented same as which is this criteria is same among these 3 concepts. These criteria which are easy to use, simple, size, easy to fabricate, strong and use a less material has been selected. As being seen, the concept B got positive criteria compared these concepts A and concept C. For fabrication process, it will proceed with design concept B since all the criteria is being fulfilled.

### 3.5 FINAL DESIGN

Done with the concept selection, this final design is the best concept among the other concept was selected. The design must be functioning as be sketching. This design will be transferred into a real product and it will be fabricated. Figure 3.5 shows the final design.

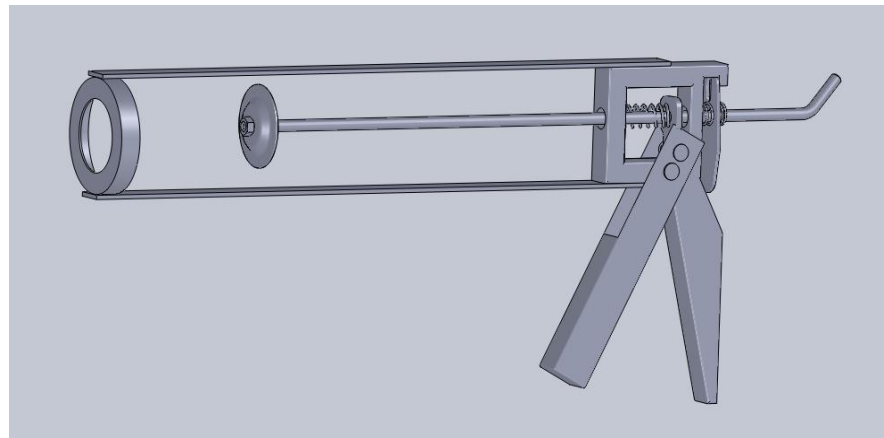


Figure 3.5 Final design

Figure 3.5 is the solid work drawing for this final design. These entire 3 concepts has been sketched and come out with this final design. This advantage of this product is it's easy to use since the spring is needed to reduce a force during the operation of this product. Next at the rod to squeeze the silicon glue, it's provided with indicator to be functioning as reference while the silicon glue is running out. For the tube at the nozzle silicon glue, the casing which made from plastic is functioning to close that area. So it may take a long time to dry and it's more saving. Next is the disadvantage of this product is required a force to squeeze the silicone glue to turn out. Since the higher viscosity of silicon glue is higher so the spring is helping to increase a force during operating.

### 3.6 BILL OF MATERIALS

Table 3.6 shows the bill of material that will be used in fabrication.

Table 3.6 bill of material

BIL	TYPE	DIMENSION (mm)	QUANTITY
1	Aluminum	200x100	1
2	Aluminum	130x30	1
3	Aluminum plate	300x15	2
4	Measuring tape		1

Table 3.6 shows the bill of material that used for the fabrication process. Before proceeding with fabrication, the material needs to be determined for the suitability. For this product, the material must have a light weight since its being used frequently and also in this maintenances work. For the frame and the grip, the aluminum has been used for this project since it's light and easy to make a cut. To support silicone glue the aluminum plate has been used for the project since is easy to make a cut. Lastly, the measuring is needed to measure the dimension of this product.

## **CHAPTER 4**

### **FABRICATION PROCESSES**

#### **4.1 INTRODUCTION**

Fabrication processes a stage after designing process. These processes are about used all the material selection to perform a product. The fabrication will refer into the final design followed by the dimension. Most of the product was made of aluminum. In a fabrication, a lot process that will be applied to produce a product such as cutting, drilling, milling and more method. The manufacturing process is different from the fabrication process in term of production quantity. The manufacturing process is the steps through which raw material are transformed into a final product. The manufacturing process begins with the creation of the material from which the design is made. Done with this fabrication the product will proceed with assembling part.

#### **4.2 PROCESS INVOLVES**

In making the final design become a real product, several processed will be applied during the fabrication. Which is measuring process, it's to measure the material into the dimension needed. An example to measure the aluminum plate and aluminum bar to get a dimension. Next is cutting process, by using a cutting machine to cut the material into the indeed dimension. The joining process is the method fastening bold and nuts and rivet. The process is used to connect the aluminum plate with aluminum bar by riveter.

Also, the milling process is creating of features on a part by cutting away the unwanted material and also to make a slot in the frame. The finishing process is used for any rough surface has to be removed with sandpaper. Also assembly process for assembly parts to another part, such as to assemble the grip and the frame by using bolt and nuts. Lastly is spraying, by using a silver spray color the whole product to look more attractive.

### 4.3 PROCESSES

The fabrication process has to be started with measuring and marking into the dimension needed. Firstly, all the parts need to measure for identifying the used part. This process is done by using measuring tape. Next, identify the types of material needed to ensure the thickness of the material is not too thick since the frame has to cut by saw tools. The types of material need to identify to ensure all parts will assembly with correct way. Done measuring and marking process, the fabrication will proceed with the drilling process. Firstly, drill the aluminum with the needed dimension to make a hole by using drilling machine. The precise measurement is needed for the spring needs to put in the slot. After drilling the hole, use the milling process as a finishing and the slot can be seen. Next, the cutting process uses to make a grip. This process which is cutting aluminum plate at figure 4.1 and makes a grip is shown in figure 4.2.



Figure 4.1 cut the aluminum plate by using shear cutting machine



Figure 4.2 shows the T-Jaw machine

The next step is joining frame and grip by using fastening bolt and nuts process. Before joint both frame and grip ensures the frame must be having an accurate size to put spring inside. To make a frame and grip easy to move, use a washer which is can provide a gap then the grip and frame did not tight each other. Done with the main frame and grip, next is cut the aluminum plate with 1mm thickness to support a glue gun. The aluminum plate will joint at the mainframe by using rivet process. An accurate measurement is needed to ensure the silicon glue is being placed properly. Figure 4.3 shows a rivet process and figure 4.4 shows the equipment when using rivets.



Figure 4.3 rivet process



Figure 4.4 rivet tool equipment

Done with mainframe, grip and aluminum, proceed with at the top of the casing glue gun. Since the university didn't provide a stamping machine and less of knowledge in using a stamping machine and the casing to close the tube of nozzle standard product are being used.

The spring and the plunger also can get it by using a standard product, since these things already provided in the market. This is also important to provide an accurate space so that the spring and plunger will function as well. Assemble the spring inside the slot of main frame, and make sure the grip will move as well.



The last process for those parts and material is finishing assemble process. The finishing process is the use of the product better and smooth in appearance. After all the parts have finished, end up this product by spraying with silver color to make an appearance more neat and tidy.



Figure 4.5 shows the finishing process

## **CHAPTER 5**

### **RESULT AND DISCUSSION**

#### **5.1 INTRODUCTION**

In this chapter, it will show the full products that have been fabricated. It's also contains with full view of this product also the product features.

#### **5.2 PRODUCT**

Figure 5.1 shows the product of the silicon glue gun. This is the product after fabricating. By using all this fabrication process and the product were produced. As has been seen, the aluminum material is being used in the product which its suit with this condition.



Figure 5.1 full view of the product



Figure 5.2 top view of the product

Figure 5.2 and figure 5.3 shows the view of the product from top and front view



Figure 5.3 front view of the product

From all this view of this product, the product is done with the fabrication process. Figure 5.1 shows the full view of the product which is silicon glue is placed on the aluminum plate. The spring and the plunger are to provide a force during the grip is pressed.

### 5.3 PRODUCT FEATURES

Figure 5.4 shows the product features. The product was created by adding an indicator which is can determine either the glue gun is running out. It must be attractive for the customer since they didn't know when the silicone glue is finished. The casing just uses a plastic material, since it will be long lasting. Due some problem, it's difficult to fabricate the casing because the sheet metal that provided by the university is out of the stock. Plus, the role that provide by university is not suitable to make a roller at the casing.



Figure 5.4 shows the casing to close silicon glue



Figure 5.5 shows the indicator

## **CHAPTER 6**

### **CONCLUSION AND FUTURE RECOMMENDATION**

#### **6.1 INTRODUCTION**

This chapter is about the problems encountered before, during and after the project. This chapter also will discuss about the conclusion of the project. A problem that will be discussed is about the entire problem encountered in every task in the project.

#### **6.2 PROBLEM ENCOUNTERED**

Many problems encountered when this project such as design concept, fabrication process and material selection.

The problem encountered during this fabrication process has been determined. The dimension must be accurate to ensure the product is functioning. If the dimension is less or over the limit, perhaps the mechanism will not function as well. Such as situations where the frame and the grip are can't to move each other or the grip cannot move as well. The concept and ideas review must be created to ensure the product is fix each other.

There also has a difficult problem during a fabrication process. The problem comes when the material does not have a dimension that the project ended. An example, the lab just provide an aluminum 200x40 while for this project is needed 200x100 for the frame part. So to get a material must be waiting for one day for instructor to cut this

material. Another problem came is when the amount of this product by using an aluminum plate is just a small size. Since the university provides a big one, so then have to find another alternative which is to find a scrap that already use in the lab. For the screw part, there are also having a problem which is the nut that provided by the university is out of stock.

Basically, the process that is used to produce a mainframe is CNC process, but due the problem and limited machine so the other alternative is done with a T - JAW machine that provided in the welding laboratory. For the grip also, the main idea to make a cut is by using a wire cut machine, since that time they are many students doing their FYP so to make a cut by T-JAW machine must be proceed.

The next problem is about material selection during started with fabrication process. Since the lab didn't provide a dimension that the product needed, the instructors recommend using a stainless steel material. This is a disadvantage to my project since the stainless steel is a stiff material. So it may take a long time to make a manual cuts. After make a discussion with the supervisor and instructor, my project can proceed by using aluminum material.

The changing of the material is also because of several matter encounters during the fabrication process. After several components are fabricated, this project didn't fit properly with each other, so the grip must be wide. Due the factor of the little time within so some of component must be bought from the market.

### **6.3 RECOMMENDATION AND FUTURE WORK**

Several recommendations and the future work have to plan so that the future plan for silicon glue gun can be functioned more efficiently. To upgrade this product should be using a better material such as plastic because it's lighter and stainless steel for longer durability. If the upgrade can be done, the product maybe can use for a long time and the customer will more satisfy. Next for the recommendation, an idea of using other material

compared with spring, such as hydraulic so the flow rate of silicon glue is increasing. Also, the indicator will be more attractive if put a sticker so the indicator more clear. Lastly, the aluminum plate which is to support silicone glue body can be exchanged by using stainless steel. Since that material is can be long lasting.

#### **6.4 CONCLUSION AND PROSPECT**

For the conclusion, the project achieves several objectives but several objectives are not achieved due to several problems. The project perhaps will be competing if got more times and more budget. However, the overall perception of the project carried out was good. Next, the fabrication process is completed and according to schedule. It's taken about eight weeks to complete this task. Furthermore, the advantage of this project is getting many new things through this project and able to handling a machine as well. An example milling machine which is a big machine so it's hard to handle alone, with the help of an instructor and members this project are able to use milling machine as well. Due to some confusion, this project was started late but still finish on time.



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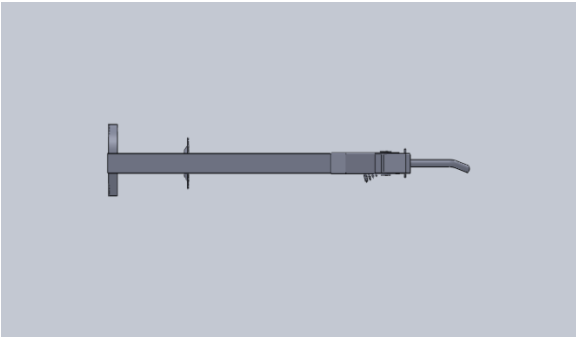
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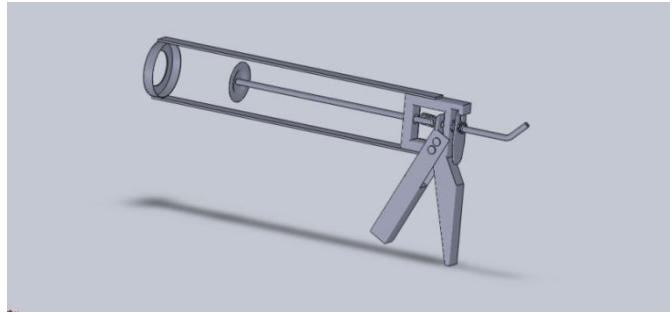
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## APPENDIX A

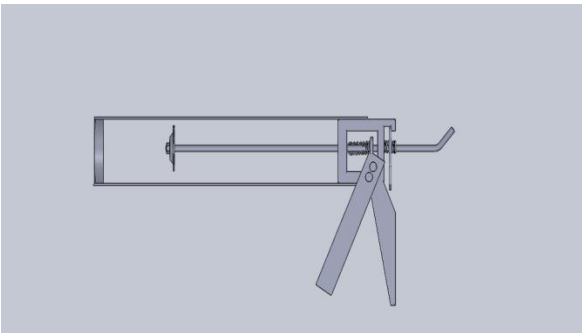
### PROJECT DESIGN



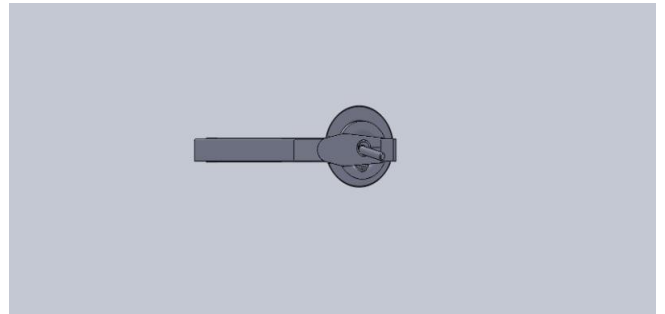
A1 Top view



A2 Isometric view



A3 Front view



A4 Side view

## APPENDIX B

### PRODUCT FEATURES



B1 casing silicon glue



B2 the indicator

## APPENDIX C

## SURFACES



C1 aluminum



C2 aluminum plate

## APPENDIX D

### PROJECT PLANNING



## APPENDIX

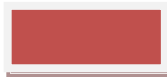
WEEK		1	2	3	4	5	6	7	8	9	10	11	12	13	14
BRIEFING PROJECT BY SUPERVISOR	PLAN														
	ACTUAL														
INTRODUCTION OBJECTIVE AND SCOPE	PLAN														
	ACTUAL														
GANTT CHART AND FLOW CHART	PLAN														
	ACTUAL														
LITERATURE REVIEW	PLAN														
	ACTUAL														
SKETCH IDEA, CHOOSE THE BEST DESIGN	PLAN														
	ACTUAL														
START MAKING PROGRESS REPORT	PLAN														
	ACTUAL														
FIRST PRESENTATION	PLAN														
	ACTUAL														
FABRICATE THE DESIGN	PLAN														
	ACTUAL														
FINAL PRESENTATION	PLAN														
	ACTUAL														
FINAL REPORT	PLAN														
	ACTUAL														

Project Gantt chart

Notes;



- Plan



- Actual