

**DESIGN AND FABRICATE OF CAT FEEDER**

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**Report submitted in partial fulfillment of the requirement for the award of**

**Diploma of Mechanical Engineering**

**Faculty of Mechanical Engineering**

**UNIVERSITI MALAYSIA PAHANG**

**JANUARY 2012**

# UNIVERSITI MALAYSIA PAHANG

## BORANG PENGESAHAN STATUS TESIS ♦

**JUDUL: DESIGN AND FABRICATE OF CAT FEEDER**

**SESI PENGAJIAN: 2011/2012**

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I hereby declare that I have checked this project report and in my opinion this project is satisfactory in terms of scope and quality for the award of the degree of Diploma in Mechanical Engineering.

Signature : .....

Name of Supervisor : MISS AT-TASNEEM BIN MOHD AMIN

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## AUTHOR DECLARATION

I declare that this report entitled 'Design and Fabrication of Cat Feeder' is the result of my own research except as cited in the references. This report has not been accepted for any degree and is not concurrently submitted in candidature for any other degree.

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## **DEDICATION**

To my beloved parent, Mr. Md Rashid bin Md Dom and Mdm. Zubaidah binti Abdul Wahab, lovely sisters, and friends, without whom and his/her lifetime efforts, in encouraging and supporting my pursuit of higher education in mechanical engineering.

## ACKNOWLEDGEMENTS

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First of all I would to express my higher appreciation to my thesis supervisor, MISS AT- TASNEEM BINTI MOHD AMIN. With the guidance, encouragement and support during completion of this theses. Also not to forget the lectures especially at the Faculty of Mechanical Engineering who have been teaching me and give me advice on this thesis. Without them, this project would not have been the same as presented here.

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## ABSTRACT

This thesis represent about the new design concept of the cat feeder. Others cat feeder comes with a lot of choices and design but not all are really good for cats. Nowadays, people are getting busier with their life and sometimes forget to take such a good care for their cat's eating time and need require some helps to ease the burden. The objectives of this thesis are to design and fabricate a manual and an entertaining of cat feeder. There are three design concepts have been suggested and by doing the scoring process, concept C has been chosen. This design consists of five parts and the used of bearing was the most critical part to be designed due to its cover casing spinning. After the fabrication, the dimension of this casing as well as the material selection becomes another critical factor while fabricating this cat feeder. After fabrication, it's found out that this cat feeder also has wasted a lot of material and wrong of selection material which is zinc. Recommended material selection will be Acrylonitrile butadiene styrene (ABS) type of plastic.

## ABSTRAK

Thesis ini mewakili tentang tempat makanan kucing yang datang dengan jenis dan konsep yang baru. Sememangnya sekarang pelbagai jenis dan corak tempat makanan kucing yang terdapat dipasaran tetapi tidak semuanya bagus untuk kucing. Pada zaman sekarang, manusia semakin sibuk dengan urusan seharian dan sesekali melupai tentang kucing dan masa makan mereka lalu mereka memerlukan sesuatu yang dapat menolong mereka mengurangkan beban tersebut.. Objektif tesis ini adalah untuk merekabentuk satu tempat makanan kucing yang digunakan secara manual dan menghiburkan. Terdapat empat konsep yang telah dicadangkan dan dengan menjalani proses permarkahan, Konsep C telah dipilih untuk direkabentuk. Ia mengandungi lima bahagian dan penggunaan bearing merupakan bahagian kritikal yang harus direkabentuk disebabkan oleh penggunaan tempat makanan dan penutup yang berpusing. Selepas dibentuk, dimensi bekas makanan ini dan pemilihan bahan telah juga menjadi satu proses yang kritikal untuk menghasilkan tempat makanan kucing ini. Tempat makanan kucing ini juga mempunyai banyak bahagian bahan yang tidak digunakan dan juga pilihan bahan yang kurang tepat iaitu zinc. Zinc merupakan bahan yang agak berat dan plastik jenis Acrylonitrile butadiene styrene (ABS) dicadangkan jika hendak menghasilkan satu tempat makanan kucing yang baik.



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## **CHAPTER 1**

### **INTRODUCTION**

#### **1.1 INTRODUCTION**

This chapter explained about the background of the project, problem statement, and project objectives. Another, this chapter also include off report arrangement.

#### **1.2 BACKGROUND**

Cat feeder is simpler types that can be used at home even without the owner. It is handling fully manual. It has 8 bowls inside so, the cat needs to turn the handle to let the food come out. Without using a battery or electricity that may passed out anytime. This way more safely and entertaining. The foods come out into the outside bowl and using a bearing inside to moving this cat feeder. Furthermore, without using electricity, this cat feeder still can be operates any time without need electric supply.

#### **1.3 PROBLEM STATEMENT**

Cat such a cute and adorable pet. Any pet need to be taken care and the owner need to be there to take care of them. Some cat cannot control their diet and will eat as long as there is food for them. In other word, the owner cannot leave the cat itself. The problem occurs when the owner has to leave their cat for a certain time and there is no one there to watch them. Furthermore, cat will be boring if there is no entertainment for

them when it's time to eat because sometimes, if the owner is there, it always has something to be excited on.

Several factors need to be considered when purchasing a cat feeder. The feeder is for the cat, so the cat convenience based on its individual characteristic, come first. The cat bowl component of the food needs to be a sufficient size to meet the cat's nutritional needs. Its must also entertaining, accessible and comfortable for the cats.

#### **1.4 OBJECTIVES**

The objectives of this project are included:

- i. To design the cat feeder
- ii. To fabricate a manual cat feeder
- iii. To fabricate an entertaining cat feeder

## **1.5 SCOPES**

This project development is limited within the following scopes:

- Designed the cat feeder by using engineering software which is solidworks
- Fabricated the cat feeder by using conventional machine and engineering tool which are EDM machine, welding machine, drilling machine, etc

## **1.6 PROJECT ORGANIZATION**

Chapter 1 is the introduction of this project. Usually it discusses project background, problem statement, the objectives and scopes.

Chapter 2 is a literature study on cat feeder used to able understanding every components or parts in cat feeder.

Chapter 3 is the methodology chapter where the objective of the project is determined. The required concept design is chosen based on objective. Each criteria of concept design is defined by the literature study. The require materials component are determine based on the chosen concept. Furthermore, the dimension of component is defined by using measurement instrument for determining the dimension for fabricated part to allow component to assemble together. Fabrication of the cat feeder is using industrial engines.

Chapter 4 is a chapter of result and discussion on this cat feeder. This new concept is use to analysis the efficiency of the food dispenses. In this chapter, the problem encountered is discussed. The solution manual to use the feeder is developed via the trial run on the feeder.



Chapter 5 is the conclusion and recommendation chapter of this project. The new concept and design of cat feeder is built based on the limitation of existing product. In this chapter, it included the conclusion of this project and improvement can be doing for the future invention.

## **CHAPTER 2**

### **LITERATURE REVIEW**

#### **2.1 INTRODUCTION**

This chapter is provided description of literature review done regards to the project title of design and fabrication for cat feeder. The literature review started with the other product of cat feeder that is widely used. There are five products that are common in the production of cat feeder. With the explanation of each product, the advantages and disadvantages can be seen in those product and can help to make upgrade for another better product.

## 2.2 LITERATURE REVIEW

### 2.2.1 Product 1



Figure 2.1: Product 1

Refer to Figure 2.1, Product 1 is the most basic of cat feeder. Basically, this type of product is made by ceramic, glass and plastic and this cat feeder bowl can be put off 200gram of cat food. Moreover, this bowl needs to be care because it too exposed to the air which is not good for cats and the cat need to be pour a food every time its hungry and it will make the owner face the difficulty to leave the cat on its own.

### 2.2.2 Product 2



Figure 2.2: Product 2

Refer to Figure 2.2, product 1 consists of two bowls which is stick together. Each bowl capacity is 250 gram. Furthermore, it uses aluminum as a material and plastic as a cover to close up the food. It also has only one cover to close up the food and this can cause food poisoning because it expose to dust and insect to come in.

### 2.2.4 Product 3



Figure 2.3: Product 3

Refer to Figure 2.3, Product 3 is used aluminum as the main material and with the two bowls that can be put 200 gram of foods. With the overall weight 7kg, this cat feeder is not really good as an option because is heavy with just only two bowls. Furthermore, the design also dangerous for cat because the sharp chamber at each of the part is disturbing the cat to eat.

## 2.2.4 Product 4



Figure 2.4: Product 4

Refer to Figure 2.4, product 2 use plastic as main material which is lighter and easy to care. Moreover, this product saving time because owner no needs to pour the food every time the food on outside bowl is empty. This is because the food store can be last for two weeks but this is still need to be in owner's care. This wont allowed the owner to leave their cat alone.

### 2.2.5 Product 5



Figure 2.5: Product 5

According to this concept, this cat feeder has timer that can control the time of food to come out. Furthermore, it also has four bowls inside it and the timer is control the movement by spinning all around the bowls. It takes eight hours for each bowl to fully open and this is difficult to the cats to concentrate on eating and to the playful cat not be able to finish its food in time.

## **2.3 CONCLUSION**

As a conclusion, the five products that are listed are the product is having their own characteristics. Each product has advantages and also the weakness that can be improve to give the best for cats. Furthermore, these all product concentrate more on the bowl's function and design.



## **CHAPTER 3**

### **METHODOLOGY**

#### **3.1 INTRODUCTION**

This chapter provides detailed explanation on the methodology of carrying out this project from beginning to the end. A detail related literature review was done and important information were required and explained in previous chapter. Therefore, in this chapter, rough idea of required parts and components are listed, measurements of each component are also determined accordingly. Sketches of each concept on cat feeder are done and only one of the concepts which fulfill target objectives is selected. Besides that, process of choosing materials and determination of machine for fabrication are also consists in this chapter. Lastly, this chapter also will look into the procedure of fabrication and assembly of a cat feeder.

### 3.2 PROJECT FLOW

Figure 3.1 shows the process flow of design and fabricate a cat feeder. The development process consists of nine phases.

Phase 1 Determination of objectives & scopes

Phase 2 Documentation of literature review

Phase 3 Concepts sketching

Phase 4 Concept selection

Phase 5 Determining required parts

Phase 6 Solid work drawing

Phase 7 Fabrication and assembly

Phase 8 Result and discussion

Phase 9 Conclusion

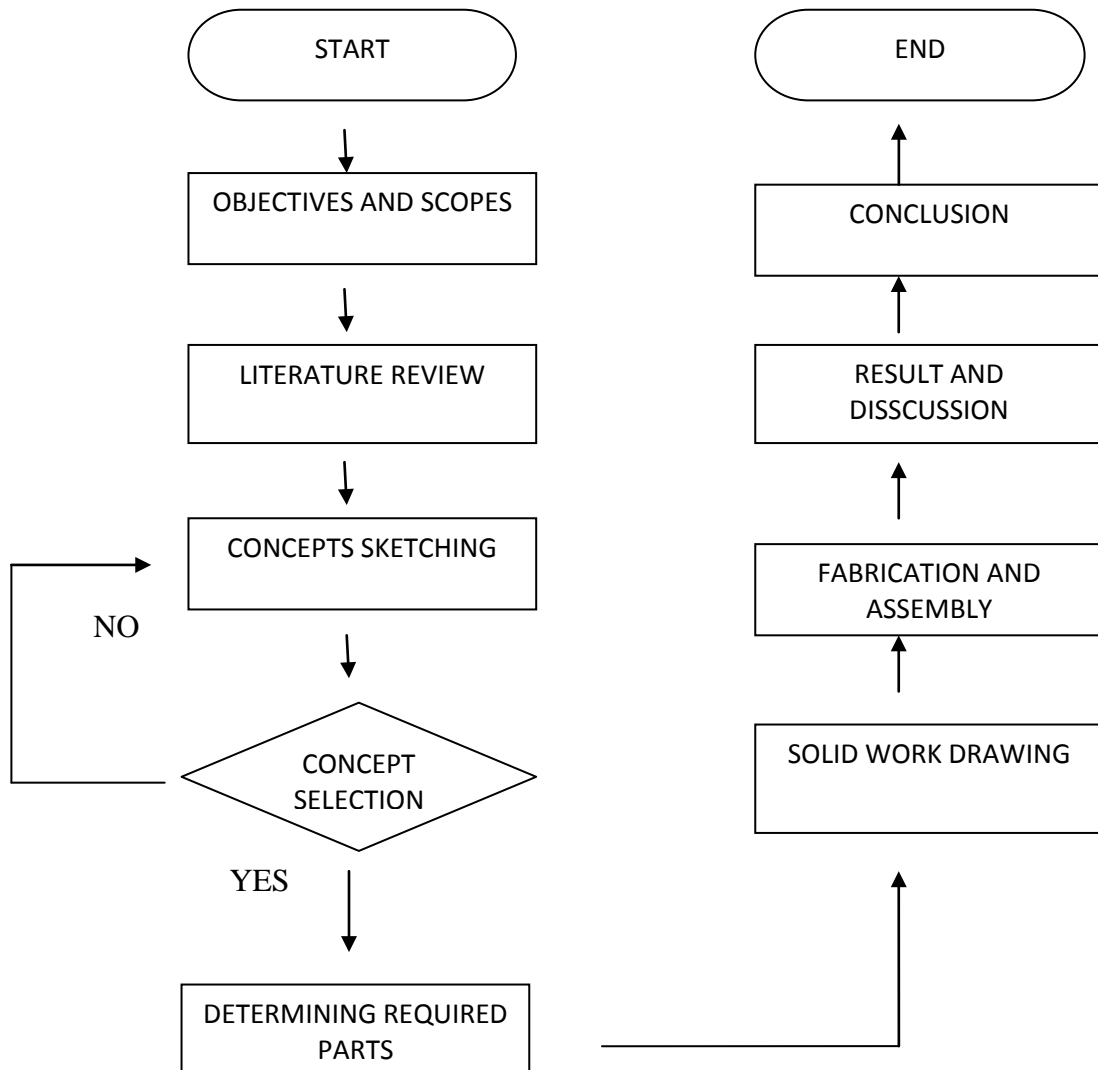


Figure 3.1 Flow chart of the object

At the first phase of the project, title of project is decided regarding discussion and consultation with project supervisor. Then, objectives and scopes of project are determined. After the determination of objectives and scopes, the project is further with searching information on literature review to strengthen the project objectives.

After searching information on literature review, documentation on chapter two is started. The literature review is used to define the rough idea of this new design of cat feeder. After the rough idea has been determined, sketching started to choose the concepts.

After the sketching, the final concept is selected based on the objectives and comparisons among each of the concepts. Then material of the concepts is verified and selected. After material have been chosen, tools and machine are determined to fabricate the cat feeder.

After the fabrication and assembly of the product, the cat feeder is used to testing the testing is document in result and discussion. Finally, this project is finished with conclusion and recommendation.

### 3.3 CONCEPTS SKETCHING

#### 3.3.1 Concept A

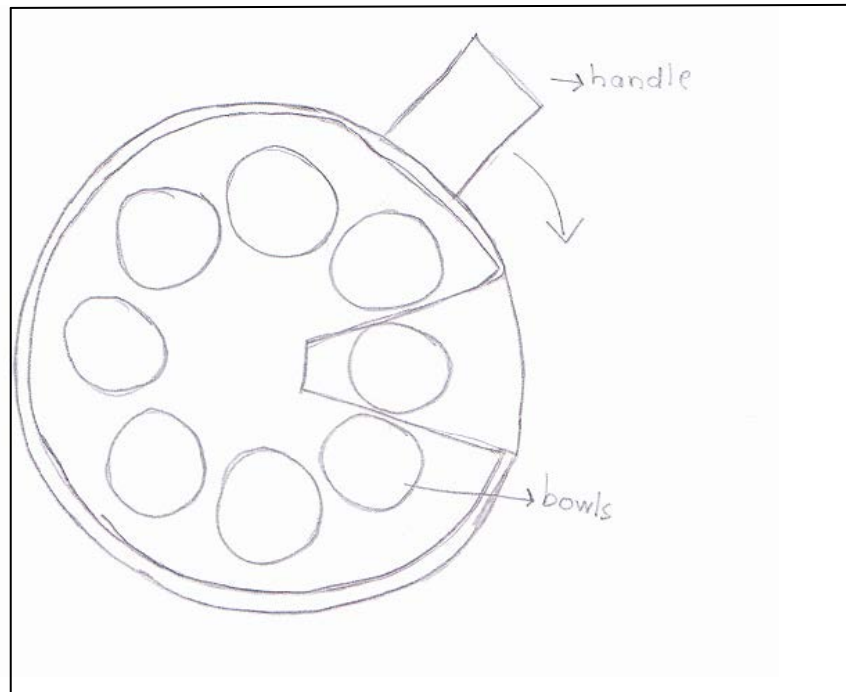


Figure 3.2: Concept A

Refer to Figure 3.2, Concept A has 8 bowls which is can store food for two days that are round in shape and the cover has the hole which allowed the cat to eat while the other bowl is closed. This is because the objective is to design the manual of cat feeder so the handle is sketching to make the cat push the handle to make the cover turn and look at others bowl.

### 3.3.2 Concept B

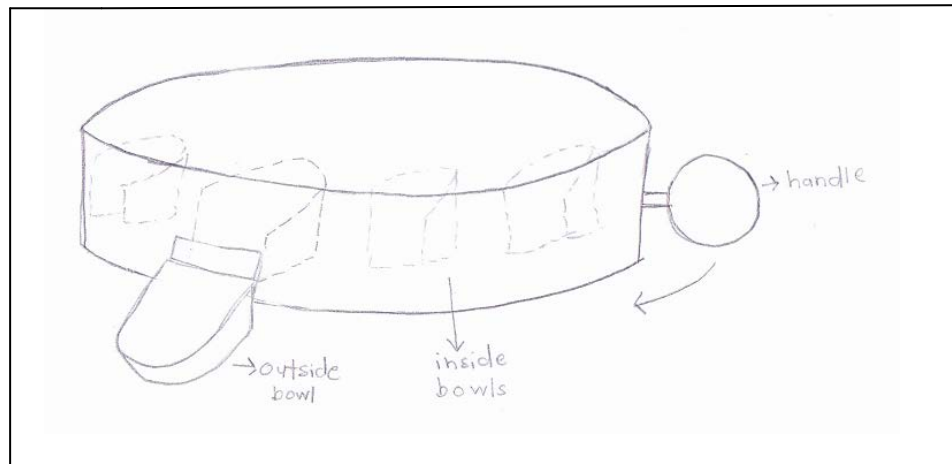


Figure 3.3: Concept B

Refer to Figure 3.3; Concept B is designed to give ease and entertaining for the cat. With the capacity of eight inside bowls, the food will come out from the hole and will go to outside bowl to allow the cat to eat. The design for eight bowls is because to keep the food for two days after roughly the cat eats for four times a day. With the handle that may attract the cat, when the cat pushes the handle, the wall that is having outside bowl will move to other inside bowl.

### 3.3.3 Concept C

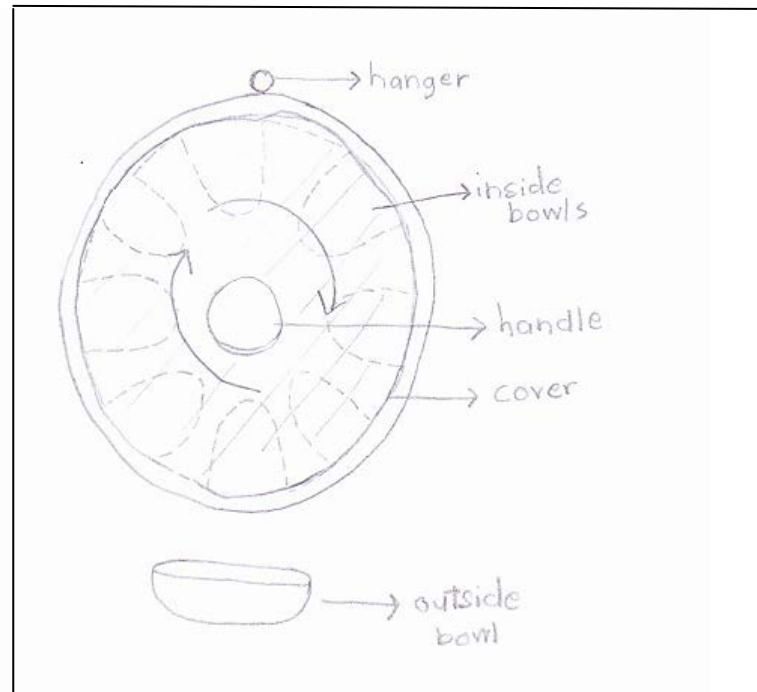


Figure 3.4: Concept C

Refer to Figure 3.4, Concept C is hanging on the wall which is the food will come out from inside bowl to the outside bowl. With the capacity of eight inside bowls, the food only can come manually but the cat if the cat push the handle that are located at the centre. When the handle being turning, the inside bowl is also turns and the food will come out and continuously. The cat can eat the food at the outside bowl. This concept same with other concept about inside bowl that have eight bowls which can last for two days.

### 3.4 CONCEPT SELECTION

Table 3.1 Concept selection

Characteristic	Score	Concept A	Concept B	Concept C
Ease of maintenance	0.6	0.08	0.07	0.08
Ease of install	0.1	0.15	0.16	0.2
Ease of use	0.2	0.25	0.2	0.3
Entertaining usage	0.01	0.02	0.02	0.03
Ease of material cutting	0.015	0.025	0.02	0.035
Ease of parts assembly	0.015	0.02	0.02	0.03
Load taken	0.02	0.03	0.03	0.035
Material wasted	0.06	0.08	0.09	0.1
<b>TOTAL SCORE</b>	<b>1</b>	<b>0.61</b>	<b>0.65</b>	<b>0.78</b>



### 3.5 SOLID WORK DRAWINGS

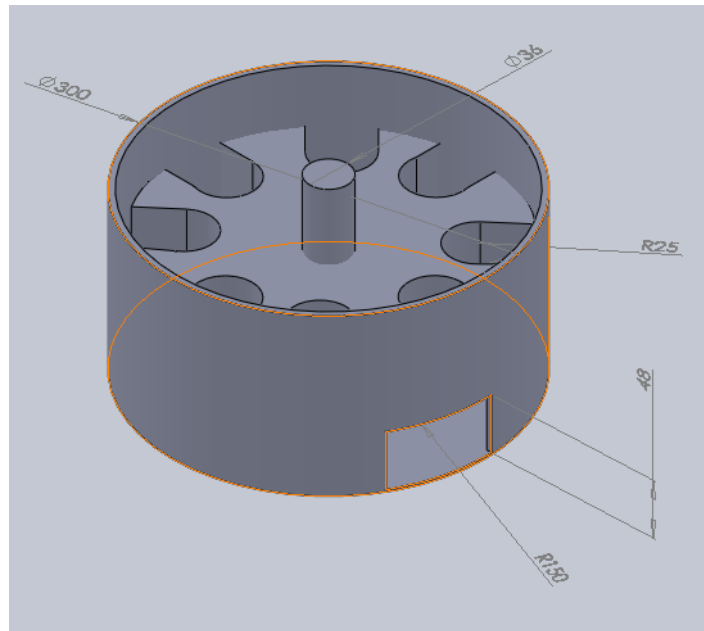


Figure 3.5 Drawing 1

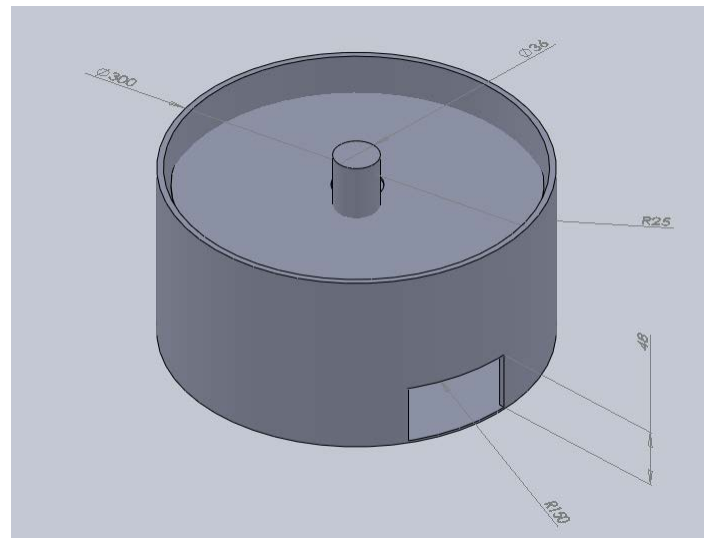


Figure 3.6 Drawing 2

### 3.6 DETERMINING REQUIRED PARTS

The required parts for combination of this cat feeder are bearing, shaft, inside bowl, the cover and handle. Table 3.2 shows the feature of required components to the design of cat feeder.

Table 3.2: The features of required components

Components	Features
Bearing	to rotate the cat feeder
Shaft	to attach and connect every parts of the cat feeder
Inside bowls	to store the cat food
The cover	to cover the foods
Bottom and wall	the fixed parts that are basic of cat feeder
Handle	to allow the cat to rotates the cat feeder to allow the food to come out

### 3.7 FABRICATION

- i. Prepare all the required materials and equipment such as zinc sheet, bearing, steel rod, hand saw.
- ii. Mark the zinc sheet with all the measurement that is written.
- iii. After that, cut the zinc sheet with cutting machine while for round shape can use EDM machine of wire cut.

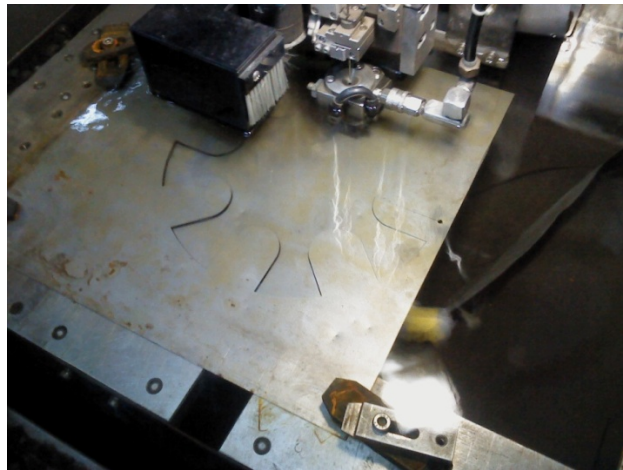


Figure 3.7 Wire cut

iv. Then, make a half hole on the wall of the cat feeder.



Figure 3.8 Cutting

### **3.8 ASSEMBLY PROCESS**

After all the cutting process, to assembly each part, welding process is required. First, welding the parts of wall and the bottom as the basic of cat feeder. After that, drilling the bottom parts to put the bearing. Put the bearing at the middle and put shaft on it. Welding the inside bowl and after that also drilling at the middle of the inside bowl to getting through the shaft. Another, drilling also the cover of the cat feeder and put each parts through the shaft follow by the sequence.



Figure 3.9 Welding Process



Figure 4.0 Drilling Process

### **3.9 CONCLUSION**

In this chapter, it can be conclude that the design and fabrication of the concept is accomplished according to the object stated. A new concept had developed to produce a cat feeder through concept selection. This project is further with testing to figure out the efficiency of this feeder.

## **CHAPTER 4**

### **RESULT AND DISCUSSION**

#### **4.1 INTRODUCTION**

This chapter consists of the improvement and result for this project. Through testing the product, the probability of efficiency is to determine the weakness of the product. Furthermore, improvement on the limitations is carried out to develop an efficiency product. Lastly, this chapter is discussing the problem encountered and the solution for problem encountered.

## 4.2 FINISHING PRODUCT



Figure 4.1 Front View



Figure 4.2 Top Views without Cover





Figure 4.3 Cat Feeder

### 4.3 DISCUSSION

According to the analysis on the cat feeder, it can be discuss that the efficiency of the cat feeder to dispense food is less efficient. The limitations consist of efficiency of rotation of bearing, the shaft, the cover of cat feeder and the handle. Moreover, the type of material sheet used is not suitable for this design due to the weight and safety for the cats. Another, there are a lot of material wasted and unnecessary space that need to be used brilliantly or eliminated but the best way to do is by make the inside bowl closed to each other and limited the space between them. This can make the cat feeder smaller, lighter and easy to take out and hang on the wall.

Furthermore, the material selection is not suitable for this cat feeder which is zinc. The best choice can be plastic. The type of plastic that is suitable is Acrylonitrile butadiene styrene (ABS) and Polyethylene with the density  $1.05\text{g/cm}^3$  and  $0.95\text{g/cm}^3$  respectively.

Moreover, the placed of the cat feeder should be 10cm from the ground, there is because the average height for small cat is 15cm which is suitable for them to reach the food with outside bowl.

#### **4.4 CONCLUSION**

In this chapter, it can be conclude that a lot of improvement that can be done to make a better cat feeder. All that weakness is discover after the fabrication and assembly process and the result is not as expectation but the discussion is done to know which is suitable for this type of cat feeder.

## **CHAPTER 5**

### **CONCLUSION AND RECOMMENDATION**

#### **5.1 INTRODUCTION**

This chapter consists summary of overall process of this project. Besides that, this chapter also includes the recommendation for further information in cat feeder.

#### **5.2 CONCLUSION**

This invention has been achieved the objective which is to design and fabricate a manual and en entertaining cat feeder. However, this cat feeder is not operating as in the design concept.

According to the testing on the cat feeder, the result state that the cat feeder is not smoothly in operation due to the size of the shaft size and the unskilled of welding and drilling process.

Therefore, in the chapter of result and discussion, there is some improvement and modified the weakness of the cat feeder.

From the studies, bearing is use to move the load more smoothly and can use for a long time without need to use power supply. Therefore, it can conclude that cat feeder is accomplished the objective where is longer life span, low cost and entertaining.

### 5.3 RECOMMENDATIONS FOR FUTURE INVENTION

- i. Improvement on the welding process on the assembly of every parts of the cat feeder. The unskilled welding process has been interrupted the smoothly of the movement of cat feeder.
- ii. Improvement of the size of the shaft. The steel rod which is used is not too fixed in the bearing hole. If can get the exactly the suitable size of the bearing hole, the movement of cat feeder can be more smoothly.
- iii. Change the zinc materials to lightly sheet such as plastic. Plastic is much more lighter and resistance corrosion. The type of plastic which is suitable is Acrylonitrile butadiene styrene (ABS) and Polyethylene with the density 1.05g/cm<sup>3</sup> and 0.95g/cm<sup>3</sup> respectively.
- iv. Improvement in the dimension of every part of the cat feeder. Slightly different of the dimension may occurs to a disturbing of smooth movement

**REFERENCE**

<http://en.wikipedia.org/wiki/Cat>

<http://en.wikipedia.org/wiki/Plastic>

<http://en.wikipedia.org/wiki/Bearing>

<http://www.perfectpetfeeder.com/>

<http://www.petsplace.com.my/products.php?cat=35>

<http://www.i-love-cats.com/>

<http://cats.about.com/>

## APPENDIX

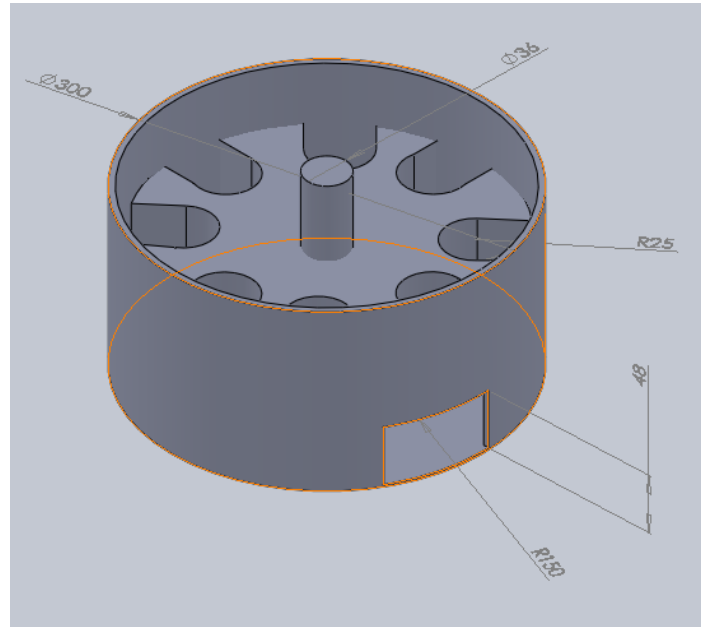


Figure 6.1: Drawing 3

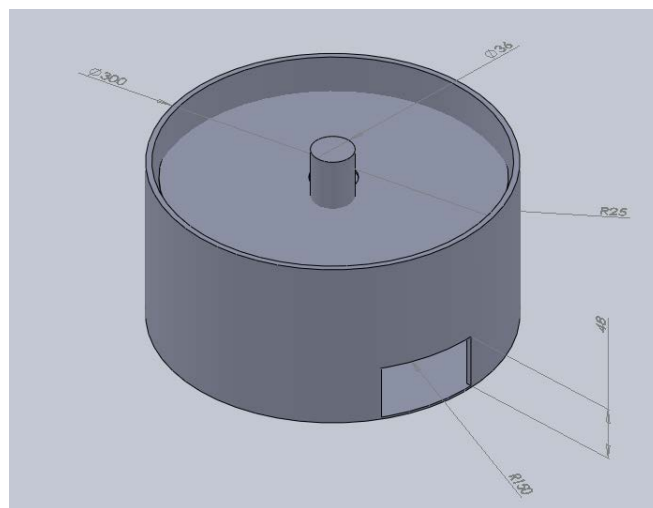


Figure 6.2: Drawing 4

## Gantt chart

Weeks works	2	4	6	8	10	12	14	16
Sketching								
Done								
Modified Sketching								
Done								
Drawing								
Done								
Progress presentation								
Done								
Choose and cut materials								
Done								
Fabrication and assembly								
Done								
Final presentation								
Done								