DESIGN AND FABRICATE THE SMART RACK SHOES

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SUPERVISOR'S DECLARATION

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 Diploma in Mechanical Engineering.

Signature :
Name of Supervisor :
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Date :

STUDENT DECLARATIONS

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

Signature :
Name :
ID. Number :
Date :

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ABSTRACT

This project is deal with the generating a new idea to produce a smart rack shoes which can be foldable and multifunction usage. The objective of this project is to design and fabricate the smart rack shoes. Some review has been through the internet and domestic area about the using and what they need in a rack shoes. Based on the research, most of the previous product is in a rigid position. Then, there are no product which providing the space or storage for a stuff like umbrella. Nowadays, users like to search a portable product and just buying a product, but it can be used for many functions. In other words, the multifunction or multipurpose product is more selected compared to the product in single function only. In order to improve the function of the existing product, a smart rack shoes with two functions is designed. This product offered the function to place the shoes and hung or holds the umbrella. Therefore, the user no need to place their umbrella under the stairs, or hung them at the wall.

ABSTRAK

Projek ini ialah bertujuan untuk mencipta idea baru untuk menghasilkan rak kasut yang boleh dilipat dan pelbagai guna. Tujuan projek ini adalah untuk mereka dan memhasilkan rak kasut pintar. Beberapa kajian telah dilakukan menerusi internet dan lawatan ke kawasan tempatan tentang kegunaan dan keperluan sebenar sebuah rak kasut. Berdasarkan kajian, kebanyakkan produk sebelum ini dalam keadaan kekal. Selain itu, tiada produk yang menyediakan ruang atau simpanan untuk barangan seperti payung. Kini, kebnayakkan pengguna lebih memilih produk mudah alih dan hanya membeli satu produk, tetapi membekalkan beberapa fungsi. Dalam kata lain, pelbagai fungsi atau pelbagai guna produk lebih menjadi pilihan berbanding produk dengan satu fungsi sahaja. Supaya fungsi sedia ada pada produk sekarang dapat diperbaiki, satu rak kasut dengan dua fungsi telah direka. Produk ini membekalkan ruang untuk meletakkan kasut dan memegang payung. Oleh itu, pengguna tidak perlu meletakkan payung mereka di bawah tangga ataupun menggantungnya di dinding.

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CHAPTER 1

INTRODUCTION

1.1 BACKGROUND

Shoe rack is a type of storage that designed to hold and arrange shoe in appropriate arrangement. Shoe racks allow us to either display or store a large number of shoes in a small area. It compacts the space that would be required otherwise. This permits us to make better use of the space. It also assists in organizing shoes, which makes it easier to keep track of them. They can be created in metal, plastic, a number of wood and other materials. This project focuses in designing the smart rack with not only functioning to place shoes, but also to hold umbrellas.

1.2 OBJECTIVES

The objective of this project is to design and fabricate the smart rack shoes.

1.3 SCOPE

1.3.1 The rack will consist of two until three shelves.

The shelves are the part to place the shoes appropriately. The maximum number of shelves for this project is two and the maximum number of shelves is three.

1.3.2 Multifunction rack

Multifunction means that a product or system with multiple functions in it. Therefore, each of the concepts established is consists of more than one more functions. All the concepts not only will function as shoes rack, but also functioning as an umbrella storage or hanger.

1.4 PROBLEM STATEMENT

Shoes rack is compulsory furniture in the house or office. But, there are still some disadvantages in the existence design. From a survey in the market, there are not many racks which can be foldable. Then, this will be difficult for people who want to move or place it at another place. This is because the shoes rack is large and hard for one people to carry it in original size.

Besides that, the umbrella doesn't have specific storage. Usually, people just placed them under stairs or hung them on the wall.

From the survey on the previous design on the market, it can be seen that lots of previous design usually hanging or screwed on the wall. This type o
rigid positioned and this will be difficult to move it to another place.

CHAPTER 2

LITERATURE REVIEW

2.1 TYPES OF SHOES RACK

2.1.1 Shoes Cabinets and Cubbies

Figure 1.0: Shoe Cabinet and Cubbies

Source: http://www.closetorganizersandstorage.com/

The design of this rack shoes is made up from wood and consist of three shelves. This is the common design available in market and suitable to be placed inside home. The advantage of this design is it has high resistance of corrosion because made up from wood and has light weight. Then, it is not only can be used as a shoes rack, but also as a cabinet to place a flowerpot. But, this product still has

its disadvantages. It is will rot if exposed to the wet air and might be attacked by termite.

2.1.2 Hanging Shoes Rack

Figure 2.0: Hanging Shoe Rack

Source: http://astrology.yahoo.com/channel/life/

The design of this type of rack shoes is simple and suitable to use at small room and limited space. They are extremely affordable, easy to assemble and install. Then, shoes will be placed on the hanging part of the rack. This rack is used by screwed it on the wall. They can be made up from many types of material such as from plastic, wood and stainless steel.

The advantage of this type of rack is, it can save the place and doesn't need a floor space to place it. Then, it is affordable and doesn't need too much assembly. But, this type still has its disadvantage. This type of rack will produce odor and will make the shoes smelly. This is because the shoes are placed in close partition.

The closed partition will have poor air flow unless the materials used to fabricate is can allow air to flow through it.

2.1.3 Free Standing Shoe Rack

Figure 3.0: Free Standing Shoe Rack

Source: http://www.lnt.com/category/3126/1/shoe-organizers.html

This type of shoes rack is a common design available in the market. This product is assembled by the customer and can be used to place any type of shoes and sneakers. Besides that, these type of rack usually being a main choice by the user because it is multifunction. It is not only can be used to placed shoes, but also can be placed the things tire pump and hammer.

The advantage of this shoes rack is, multifunction and affordable. It can hold shoes and any things that don't have specific storage. But, there is still weakness in this product. They are easy to corrode and the user has to assemble the rack by their own.

2.2 TYPE OF MATERIAL

The common type of materials used to fabricate a rack shoes are wood, zinc and stainless steel.

2.2.1 Wood

Wood is a hard fibrous tissue found in many plants. It has been used for centuries for both fuel and as a construction material for several types of living areas such as houses. It is an organic material, a natural composite of cellulose fibers which are strong in tension, embedded in a matrix of lignin which resists compression.

In the strict sense wood is produced as secondary xylem in the stems of trees and other woody plants. In a living tree it transfers water and nutrients to the leaves and other growing tissues, and has a support function, enabling woody plants to reach large sizes or to stand up for themselves. Wood may also refer to other plant materials with comparable properties, and to material engineered from wood, or wood chips or fiber.

People have used wood for millennia for many purposes, primarily as a fuel or as a construction material for making houses, tools, weapons, furniture, packaging, artworks, and paper. Wood also used to fabricate the rack shoes because of its features that high resistance in corrosion. Below is the example of the shoes rack made up of wood.

Figure 4.0: Rack made up from wood

Source: www. Yishunbamboo.en.alibaba.com

2.2.2 Zinc

Zinc also known as spelter, is a metallic chemical element. It has the symbol Zn and atomic number 30. It is the first element in group 12 of the periodic table. Zinc is, in some respects, chemically similar to magnesium, because its ion is of similar size and its only common oxidation state is +2. Zinc is the 24th most abundant element in the Earth's crust and has five stable isotopes. The most exploited zinc ore is sphalerite, a zinc sulfide.

The metal is hard and brittle at most temperatures but becomes malleable between 100 and 150 °C. Above 210 °C, the metal becomes brittle again and can be pulverized by beating. Zinc is a fair conductor of electricity. For a metal, zinc has relatively low melting, 420 °C and boiling points, 900 °C. Its melting point is the lowest of all the transition metals aside from mercury and cadmium.

Usually Zinc sheet always used in fabrication of furniture such as rack, table and wardrobe. Below is an example of the shoes rack made up of zinc sheet.

Figure 5.0: Rack made up from zinc

Source: www.ykrisheng.en.alibaba.com

2.2.3 Stainless steel

In metallurgy, stainless steel is defined as a steel alloy with a minimum of 10.5 or 11% chromium content by mass. Stainless steel does not stain, corrode, or rust as easily as ordinary steel, but it is not stain-proof. It is also called corrosion-resistant steel or CRES when the alloy type and grade are not detailed, particularly in the aviation industry. There are different grades and surface finishes of stainless steel to suit the environment to which the material will be subjected in its lifetime. Stainless steel is used where both the properties of steel and resistance to corrosion are required. Stainless steel differs from carbon steel by the amount of chromium present. Carbon steel rusts when exposed to air and moisture. This iron oxide film or the rust is active and accelerates corrosion by forming more iron oxide. Stainless steels contain sufficient chromium to form a passive film of chromium oxide, which prevents further surface corrosion and blocks corrosion from spreading into the metal's internal structure.

Because of these special features, stainless steel is used in many types of application. It is widely used in sculpture making, automotive, aerospace and furniture industry. Below is the example of the application of stainless steel in industry.

Figure 6.0: Rack made up from stainless steel

Source: http://www.bakati.com/

Figure 7.0: Sculpture made up from stainless steel

Source: http://www.brucegray.com/

CHAPTER 3

METHODOLOGY

3.1 INTRODUCTION

In order to produce a new product without facing big problem in designing and fabrication process, we have to construct an early planning. A part of the planning is the method to implement before, during and after the process.

3.2 DESIGNING CONCEPT

3.2.1 Concept 1

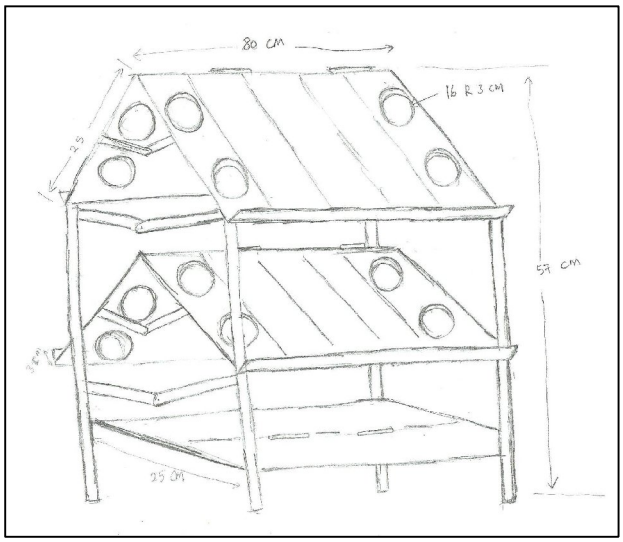

Figure 8.0: Concept 1

This concept is consists of two main function. It can be used as shoes rack and umbrella storage. The main material will be used to fabricate it, is zinc sheet only. The advantages of this concept are, foldable, portable and multifunction. But, this concept still has its weakness. The rack cannot be used anymore if their supports break down or failed.

3.2.2 Concept 2

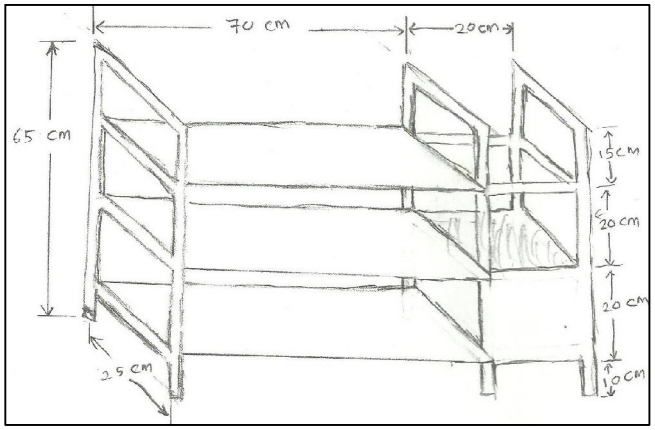

Figure 9.0: Concept 2

Concept 2 are consists of two main functions. It will be functioning as shoe rack and umbrella storage. The main materials will be used to fabricate it is zinc sheet also. The advantages of this concept are, multifunction which is includes umbrella storage and no user assembly required. Then, the disadvantage of this concept is not portable and heavy.

3.2.3 Concept 3

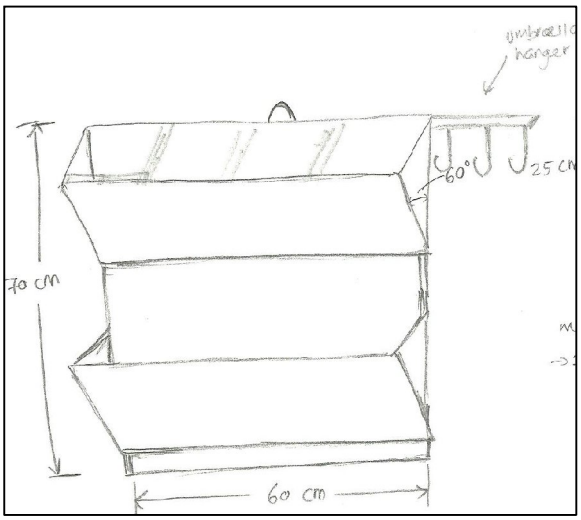

Figure 10.0: Concept 3

This concept will be functioning with two functions, as a shoe rack and an umbrella hanger. The main material will be used to fabricate it are zinc sheet. The advantages of this concept are, can be hanging on the wall and multifunction which is can hang the umbrella. This type of rack is preferable in saving the space of the room. Then, the disadvantages of this concept are big, heavy and might be dangerous.