Designing an Auto Retractable, Manual Retractable & Permanent Car Cover to Provide Shelter from Heat & Rain during Moving & Stationary (Parking)

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ABSTRACT

The project aims to design & manufacture a permanent car cover that has aerodynamic shape to be of shelter to car & hence reduce the temperature & give comfort to the car user. Malaysian hot climate leaves a car extremely heated up. Furthermore the extra light from the sun affects visibility. Heavy rain can also reduce visibility when the raindrops hit the windshield. These may contribute to road accidents. A concurrent design approach will be used in designing and doing prototype for this device. The analysis includes analysis on aerodynamic capacity of the design for permanent cover & moving car. Beside that the research will study & use the appropriate material that can absorb and/or reflect heat & hence not disperse it to the car. A device will be designed & analyzed which can reduce the heat imposed by the hot sun. It will cover up the roof of car. It is hope that with this device people can be more comfortable in their vehicle. Beside that several alternative is given to the user to choose which kind of shelter is best for them, namely auto/manual retractable cover or permanent cover. People will feel more comfortable & less stress while driving hence reduce accident.

KEYWORDS

Design for Manufacture & Assembly, Car Cover

1. INTRODUCTION

The purpose of this project is to develop and design the component of auto retractable roof. Therefore, the approach of the design that features here could be use or implement for a car especially. Auto Retractable Roof is the alternatives can be used to cover the car from the sunshine effect. This application use for a new alternatives car covers when we park our car under sunshine. The retractable is used to save the body car from corrosion and in the same time save the passenger from the heat after park under sunshine with high temperature is about **36.5°C**. Other more, this product use the motor to generate the roof before engine car were switch off. Then, the power is used to move the motor. Finally, the motor is used to generate the mechanical system of the retractable roof with the material for the cover the car between the roof and the mirror.

Auto Retractable Roof is the news idea for the accessories for vehicle that combined from battery and the retractable sunshade to produce a power. This is more suitable for a long time when park in the sunshine, which compare than other car cover at the market nowadays. It also can be used for hanging around or fun purpose using the remained car cover at the roof.

2. BACKGROUND

This chapter includes all the information about the Auto Retractable Roof. Automobiles, like the earth's atmosphere, are subject to the so-called "greenhouse effect." When short-wave heat radiation from the sun travels through the glass windows and hits material inside the car, the interior heats up, and the heat is trapped inside. Cars also get hot because the sun heats up the roof of the vehicle and the heat conducts inward. The thickness of the insulation in the roof and walls of most cars and trucks is a fraction of what is used in the attics of most buildings.

The result of these two effects is that the temperature of the interior of automobiles that are parked in bright sun in hot climates can rise to more than **(±36.5°).** After existing in this condition for a while, not only is the air in the car very hot, but all of the material in the interior of the car (dashboard, seats, arm rests, etc.) is as well - even to a depth of several inches. When a driver enters the car, it can take 10-20 minutes for even the best automobile air conditioners to cool the space around the driver to a comfortable temperature. If there are several passengers, and the air conditioner vents are directed at all of them, the cool-down time can take at 30-40 minutes. Several devices have been developed to reduce the heat build-up in cars. Some of these are listed as follows:

- **Tinted glass.** This helps reduce the green house effect somewhat, but does nothing to reduce the inward conduction of heat from the roof.
- **Windshield reflectors.** These are positioned inside the windshield to reflect the short-wave heat radiation back out through the windshield. But the sun continues to enter through the other windows. And, of course, these reflectors do nothing to stop the heat conducting through the roof.
- **Increased insulation.** Unfortunately, the roof of a car is not thick enough to hold enough conventional insulation to be very effective.
- **Traditional automobile covers.** These are effective to the extent that they stop the short-wave heat radiation, but they are trouble to put on and take off a car and are rarely used.

Electrical ventilators. Most of these pump hot air out too slowly to keep the car cool. (http://www.covercraft.com/weathershield.htm (February 1999)

2.1 Temperature and Heat

An object temperature is a measurement that describes the level of motion and vibration in the atoms and molecules of which it is composed (that is, the internal energy of the atoms and molecules). The higher the temperature of the object, the more vigorously its atoms and molecules move around and bounce off each other, and the more disorderly is their motion. This means that heat flowing into an object increases the internal energy and disorder in that object, while heat flowing out of it decreases its internal energy and disorder. For example, the water molecules in a snowflake are arranged in an orderly pattern. If you hold a snowflake in your hand, it will melt and become a drop of water. While it melts, the orderly pattern of the snowflake is changed into the more disorderly form of liquid water.

3. METHODOLOGY

Methodology is the approach that been used to design the auto retractable roof for vehicle in this project. Design is about developing and producing systems and products that suit the job they are intended for. Design can be seen as a series of steps from initially thinking of an idea for a product to eventually having a marketable product that will be cost effective to produce. A common assumption in design is that a system or product suitable for use by an average user is good design. This project involved the design method to produce and use component that available in market and only involved the analysis of auto retractable roof, motor and also material for auto retractable roof.

3.1 Product Design Specification (PDS)

The PDS is the fundamental control mechanism that allows this success to manifest itself. The PDS must be comprehensive and unambiguous. At the end of the design process the product must *balanced* with the PDS. Poor PDS leads to poor design that will fail in the market. Good PDS does not guarantee good design but make the goal more attainable. The actual Product Design Specification is a key piece of the product development process. Besides just stating the facts of a design problem, the PDS should imply as much information as is reasonable to assume about a problem. The richer the description of the problem, the more it is likely that a design team will think of an interesting solution. In order to see how concept maps can be used to represent a PDS, consider the following problem: *Design a new auto retractable roof for vehicle purpose usage to give the comfortable for vehicle user and reduce the in car temperature.* After doing the questionnaire session, the following list comes out:

a) the roof must be useful
b) it could be an automatic or permanent feature at the top roof of vehicle.
c) it should be stiff and comfortable for users
d) it must be safe
e) it could be made of polyethylene fabric.
f) it should be relatively inexpensive (RM350-500)
g) it must be durable
h) it need to be attractive or stylish

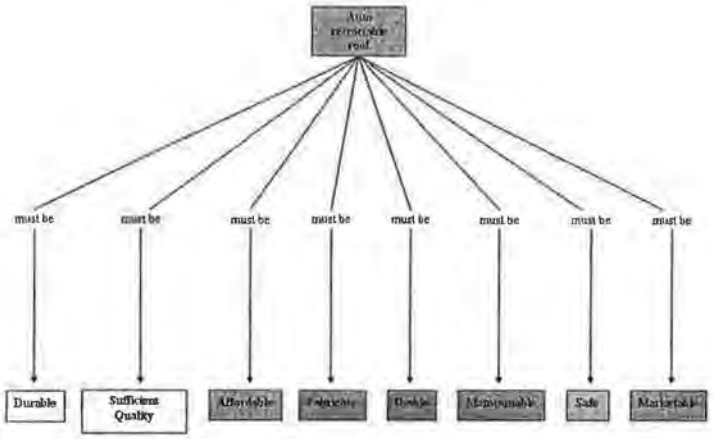

Fig. 1 PDS Concept.

4. QUALITY FUNCTION DEPLOYMENT

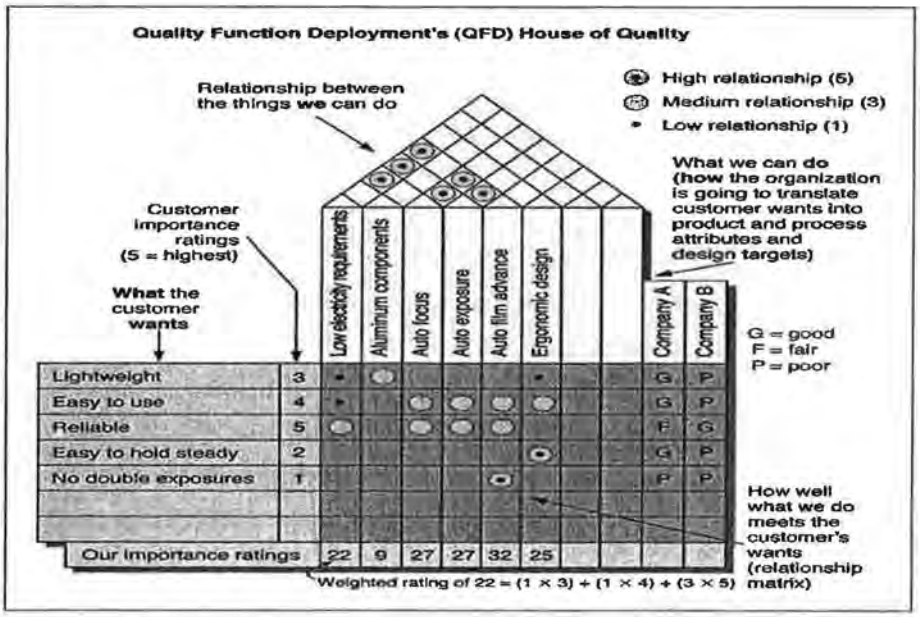

Fig. 2 the house of QFD

5. IMPLEMENTATION

The highest point that concept design 4 got in the evaluation criteria selection had been choose as the final design. It means that concept 4 will be the design that will be draw detail as a detail design. All the details about the final design will be propose in the next semester. The detail design will include the dimension, isometric view and type of material using special software.

5.1 AUTO RETRACTABLE ROOF ADVANTAGES.

The auto retractable roof has a few advantages comparing with the existing sunshade in the market. The advantages are:

1. People can always be cool and always comfortable in a vehicle.
2. Reduce the accident statistic.
3. To reduce the temperature in the car during parking.
4. Always get the cool temperature in a car.

5.3 THE AUTO RETRACTABLE ROOF DISADVANTAGES.

Although the auto retractable roof ladder has many advantages, there are also disadvantages that must be considered. There are: -

- The cost of producing the roof is high
- This product is the new in the market.
- May take time to give confidence to the customer
- Need time to assemble.

6. CONCLUSION

To design the new product, there have a lot of thing that must be considered. To identify this problem, survey concept must be applied and this concept includes questionnaire survey. Then all feedback from public can improve our data and reinforce to producing this product. After that, we can apply for the concept that was chosen.. From the concept, a conceptual design is drawn to choose the best concept that can be implementing or fabricate for this semester within the successful analysis base on the software of QFD and also the method of the software are use to analyze the result. To use this QFD software, the first step is we must know the technical requirement and what the customer need is when we perform the case study. It means before we started the case study, we must identified the technical requirements criteria to ensure our result can be used and can determined the product that we purpose to produce. In manufacturing, QFD is the best method to purpose a new product with the results from the customer (VOC) and the successful of this final year project is the way that I can learn the QFD method to come out the new product. This project has been achieved of my objective to produce the new product (Auto Retractable Roof) with the QFD method and implement the prototype for this

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