DESIGN & FABRICATION THE FRONT SKIRT OF PROTON SATRIA

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ABSTRACT

This project present about front skirt of Proton Satria car. The objective this project is design and fabricates front skirt of Proton Satria car. Front skirts are fabricated using fiberglass as its raw material. The reason why front skirts are made out of fiberglass is because it is known for its lightness and it could stand shock or impact. When a car with an aerodynamic front skirt is speeding, the car will be stabilized by the front skirt because of its aerodynamic shape that produces downward force to the car therefore, the faster the car is the more stabilized it gets. The idea of fabricating front skirts for cars came because there's many product of this type already in the market. This makes it easier to find information about how it is fabricated through the internet. The design of skirt that have curve shape can give aerodynamic properties such as that can reduce the air resistance when driving. Also, car looks nice and more speeding when using front skirt. Design three dimension the front skirt of Proton Satria is using solid work software. The result for first product is cannot successful because the mould polystyrene is inactive when touch resin. The result for second product is successful when use reused front skirt as a mould. The result for testing to assemble front skirt with Proton Satria model car is successful without problem. As conclusion, this project is successful followed by objective and scope.

ABSTRAK

Projek ini menerangkan tentang skirting dibahagian hadapan kereta Proton Satria. Objektif projek ini ialah mencipta dan menghasilkan skirting hadapan kereta Proton Satria. Skirting bahagian hadapan kereta ini dihasilkan menggunakan gentian kaca. Gentian kaca mempunyai banyak kelebihan. Antara kelebihan gentian kaca ialah ringan dan dapat menahan hentakan. Apabila sesebuah kereta yang mepunyai skirting bahagian hadapan meluncur laju, daya apungan pada kenderaan yang meningkat akan distabilkan kerana skirting bahagian hadapan akan menghasilkan daya yang berlawanan iaitu daya tekanan ke bawah. Idea pembuatan skirting bahagian hadapan kereta ini terhasil setelah terdapat banyak assesori kereta di pasaran. Hal ini menyebabkan sedikit maklumat cara pembuatannya mudah didapati di internet.Bentuk skirting yang mempunyai banyak lengkung menyebabkan skirting mempunyai sifat aerodynamic. Antara sifat aerodynamic ialah dapat mengurangkan rintangan angin semasa pemanduan. Kereta yang memakai skirting bahagian hadapan akan kelihatan cantik dan agak laju sedikit berbanding kereta yang tidak menggunakan skirting dibahagian hadapan. Struktur tiga dimensi skirting hadapan Proton Satria dihasilkan menggunakan perisian lukisan solidwork. Keputusan untuk produk pertama tidak berjaya kerana acuan skirting hadapan menggunakan polistirena telah cair apabila terkena resin. Keputusan untuk produk kedua telah berjaya setelah menggunakan skirting hadapan terpakai sebagai acuan. Keputusan ujian pemasangan skirting hadapan dengan kereta Proton Satria sebenar telah berjaya tanpa masalah. Kesimpulannya, projek ini telah berjaya mengikut segala objektif dan skop

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INTRODUCTION

1.1 Project Synopsis

1.1.1 General Project Synopsis

The project was purpose to designing and fabricating a front skirt of car. In this study, we need to create the front skirt and make sure the front skirt suitable for the car

1.1.2 Specific Project Synopsis

My project title is Design and Fabrication of front skirt car. The project involves the analysis of the front skirt developed earlier with concerns regarding strength, material and cost. Choose the better designed from many propose design and fabricated front skirt, tests are required to be conducted and to verify the design. The projects prerequisites are material and strength of material. Overall, we will acquire the skills of design and fabrication

1.2 Problem Statement

The idea of fabricating front skirts for cars came because there's many product of this type already in the market. Made many propose design and made concepts selection for chose the better design. The design of skirt that have curve shape can give aerodynamic properties such as that can reduce the air resistance when driving. Also, car looks nice and more speeding when using front skirt. Fabricate design follow modal car for assemble when finish the project. The front skirt should suitable of model car.

1.3 Project Scope of Work

There is several scope of this project:

i. Design :Design many propose front skirt, then select the better design
ii. Fabrication: Fabricate skirt using Fiberglas
iii. Assemble it into model car.

1.4 Project Objective

Basically this project is base on this objective:

1.4.1 To design a front skirt of car.
1.4.2 To fabricate a front skirt of car..

1.5 Project Planning

Table 1.1 : Project schedule

Project Activities	Weeks													
	1	2	3	4	5	6	7	8	9	10	11	12	13	14
Literature Review														
Methodology study														
Design & Measurement														
Material preparation														
Fabrication														
Evaluation & Improvement														
Report writing														
Presentation														

CHAPTER 2

LITERATURE REVIEW

2.1 Introduction

The design front skirt of car model varies from product to product and industry to industry. Before the design of a product can begin, the need for that product must be established. The main source for design projects or development of a new product idea is market demand. About 80 percent of a new product development is market-driven. Without customer for the product, there is no way to recover the costs of design and manufacture.

Thus, the most important part in understanding the design problem lies in assessing the market which is establishing what customer wants in the product. Even though the resulting ideas may be innovative and clever, they are useless unless they can be matched to a market need or a new market can be developed for them.

Additionally, a design project for a new product or some feature of a product can be initiated by the desire to redesign it. Redesign is fostered by market demand for a new model or the desire to include a new technology in an existing product. Redesign can also be initiated to fix a problem with an existing product, reduce product cost, simplify manufacturing, and respond to a required change of materials or for many reasons. Often the desire to change the product design is the need of the product to be less expensive, to have new features or to last longer.

2.2 Type of Skirt

2.2.1 Front Skirt

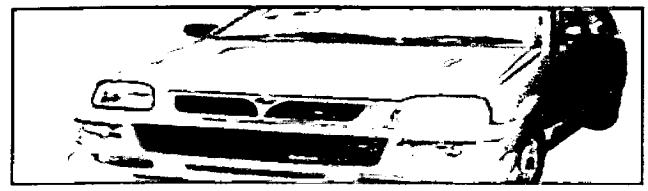

Figure 2.1: Kancil Front Skirt

2.2.2 Rear Skirt

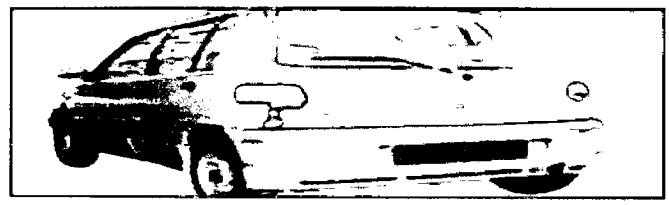

Figure 2.2: Kancil Rear Skirt

2.2.3 Side Skirt

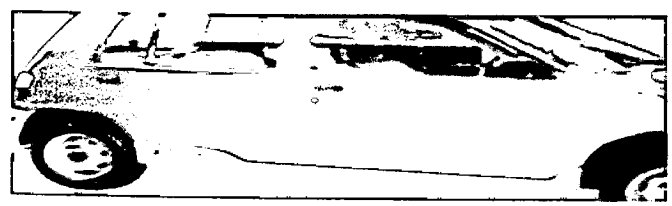

Figure 2.3: Kancil Side Skirt

2.3 Research Background

2.3.1 Aerodynamics

Aerodynamics (shaping of objects that affect the flow of air, liquid or gas) is a branch of fluid dynamics concerned with the study of forces generated on a body in a flow. The solution of an aerodynamic problem normally involves calculating for various properties of the flow, such as velocity, pressure, density, and temperature, as a function of space and time. Understanding the flow pattern makes it possible to calculate or approximate the forces and moments acting on bodies in the flow. This mathematical analysis and empirical approximation form the scientific basis for heavier-than-air flight.

Aerodynamics has played a major role in car racing since the late 1960s, when introduction of the first inverted wings appeared in some formulas. After that time, improved wing systems taken from the aeronautic technology made leaps forward, improving consistently lap times, increasing cornering speeds and vehicle stability. With the introduction of the ground effect a few years later the vehicles used a third element (the under body) to produce downforce, and hence improve the performances of the car.

In many, if not most, of the passenger vehicles we see on the road, aerodynamics plays a comparatively minor role in the overall design of the vehicle. Aside from making a car as aerodynamically safe as possible within specific design parameters, other considerations arguably play more prominently into the final production line of most vehicles. One of the parts related to the aerodynamic concept is skirts which have two effects. It can:

i. Reduce drag
ii. Reduce front-axle lift.

2.3.2 Ground Effect in Cars

In racing cars, a designer's aim is not for increased lift but for increased downforce, allowing greater cornering speeds. (By the 1970s 'wings', or inverted aerofoil, were routinely used in the design of racing cars to increase downforce, but this is not ground effect.) This kind of ground effect is easily illustrated by taking out on a windy day and holding it close to the ground, it can be observed that when close enough to the ground the tarp will suddenly be sucked towards the ground.

However, substantial further downforce is available by understanding the ground to be part of the aerodynamic system in question. The basic idea is to create an area of low pressure underneath the car, so that the higher pressure above the car will apply a downward force. Naturally, to maximize the force one wants the maximal area at the minimal pressure. Racing car designers have achieved low pressure in two ways: first, by using a fan to push air out of the cavity; second, to design the underside of the car so that large amounts of incoming air are accelerated through a narrow slot between the car and the ground, lowering pressure by Bernoulli's principle. Official regulations as of 2006 disallow ground effects in many types of racing, such as Formula One.

2.3.3 Downforce

The term downforce describes the downward pressure created by the aerodynamic characteristics of a car that allow it to travel faster through a corner by holding the car to the track or road surface.

The same principle that allows an airplane to rise off the ground by creating lift under its wings is used in reverse to apply force that presses the race car against the surface of the track. This effect is referred to as "aerodynamic grip" and is distinguished

from "mechanical grip," which is a function of the car mass repartition, tires and suspension.

Two primary components of a racing car can be used to create downforce when the car is traveling at racing speed:

i. The shape of the body

ii. The use of airfoils.

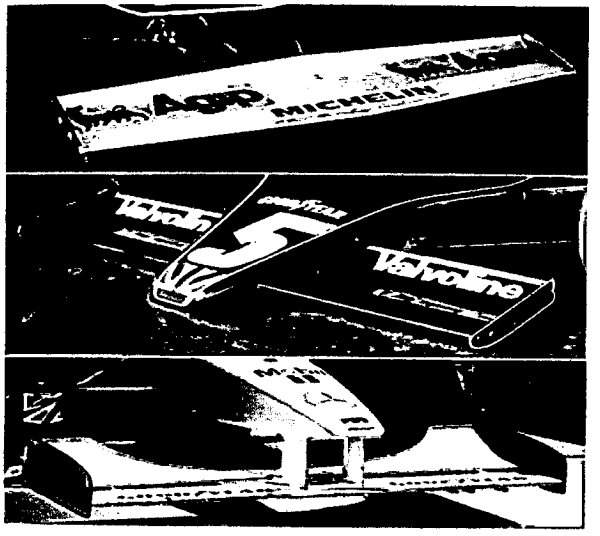

Figure 2.4: Example shape using down force concept

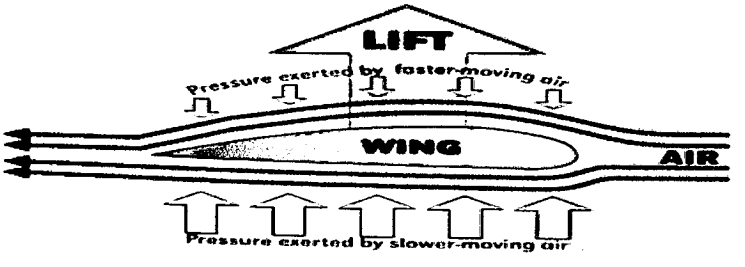

Figure 2.5: Downforce principle

Another important aspect of aerodynamics is the drag, or resistance, acting on solid bodies moving through air. The drag forces exerted by the air flowing over an airplane, for example, must be overcome by the thrust force developed by the engine. These drag forces can be significantly reduced by streamlining the body. For bodies that are not fully streamlined, the drag force increases approximately with the square of the speed as they move rapidly through the air.

Spoilers and skirts do a few things to reduce the drag profile-a 3-D measure of the laminar (non-turbulent or "flat" air) and turbulent air pressure on the race car which acts as a friction force against the car and increase pitch stability, while also aiding the traction. Spoilers and skirts act in similar fashion to create lift and to stabilize air flows at opposite ends of the vehicle.

The device in the front is the skirt which acts just like the original car model, with the added benefit of streamlining the car for a smoother ride. With out interaction the air would flow relatively smoothly; laminar for our example. However, due to the ground surface interacting with the air, called ground interaction, the air under the car spins into a bumpy turbulence, and at high speeds can begin to buffet the car and significantly reduce traction. The ground skirt's interaction with the under body current is also called ground slip, and provides a small downward force on the nose of the car as well.

2.3.4 Bernoulli Principles

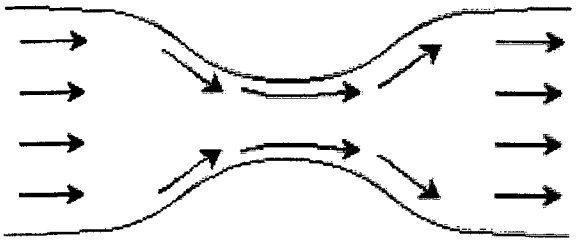

Figure 2.6 Bernoulli principle

Bernoulli's principle is used in aerodynamics to explain the lift of an airplane wing in flight. A wing is so designed that air flows more rapidly over its upper surface than its lower one, leading to a decrease in pressure on the top surface as compared to the bottom. The resulting pressure difference provides the lift that sustains the aircraft in flight. If the wing is turned upside-down, the resultant force is downwards. This explains how performance cars corner at such high speeds. The downforce produced pushes the tires into the road giving more grip.

2.3.5 Fiber –Reinforced Composites

The most popular type of composite material is the fiber-reinforced composite geometry, where continuous or discontinuous thin fibers of one material are embedded in a matrix of another. The matrix support and transmits forces to the fibers, protect them from environments and handling, and provides ductility and toughness, while the fibers carry most of the load and impart enhance stiffness. Wood and bamboo are two naturally occurring fiber composites, consisting of cellulose fibers in a lignin matrix.. Automobile tires now use fibers of nylon.

Glass-fiber reinforced resin, the first of the modern fibrous composites, were developed shortly after World War II in an attempt to produce lightweight material with high strength and high stiffness. Glass fibers about 10μm in diameter are bounded in a variety of polymers, generally epoxy or polyester resins. Between 30 and 60% by volume is made up of fibers of either E-type borosilicate glass (tensile strength of 500 ksi and elastic modulus of 10.5 X 10^6 psi) or the stronger, stiffer, high-performance S-type magnesia-alumina-silicate glass (with tensile strength of 670 ksi and elastic modulus of 12.4 X 10^6 psi).

It is important to note that a fiber of material tends to be stronger than the same material in bulk form because the size of any flaw is limited to the diameter of the fiber. Moreover, the complete failure of a given fiber does not propagate through the assembly, as would a flaw in an identical bulk material.

Glass fibers are still the most widely used reinforcement, primarily because of their lower cost and adequate properties for many applications. Current uses of glass-fiber-reinforced plastics include sporting goods, boat hulls and bathtubs. Limitations of the glass-fiber material are generally related to strength and stiffness. Alternative fibers have been developed for applications requiring enhance properties. Boron-tungsten fibers (boron deposited on a tungsten core) often an elastic modulus of 380,000 MPa (55 X 10^6 psi) with tensile strength in excess of 2750 MPa (400 ksi). Silicon carbide filaments (SiC on tungsten) have an even higher modulus of elasticity.

Within the composite, the reinforcing fiber can be arranged in a variety of orientations. Fiberglas, for example, contains short, randomly oriented fibers. Unidirectional fibers can be used to produce highly directional properties, with the fibers directions being tailored to the directional of loading. Woven fabrics or tapes can be produced and then layered in various orientations to produce a plywood-like product. The layered material can be stitched together to add a third dimension to the weave, and complex three-dimensional shape can be woven from fibers and later injected with a

matrix material. The properties of fiber-reinforced composites depend strongly on several characteristics:

i. the properties of the fiber material;
ii. the volume fraction of fibers;
iii. the aspect ratio of the fibers, that is, the length-to-diameter ratio;
iv. the orientation of the fiber;
v. the degree of bonding between the fiber and the matrix; and
vi. the properties of the matrix. The matrix materials should be strong, tough, and ductile so they can transmit the loads to the fibers and prevent crack from propagating through the composite.

CHAPTER 3

PROJECT METHODOLOGY

3.1 INTRODUCTION

This chapter discussed about methods to designing and fabricating a front skirt of car model. All the methods explained in this chapter are very important procedure to ensure the follow of the research move smoothly. Effective methods will give clear view on how to do research. These methods will be guidance in research management. Whole process will be explained in this chapter also. So it will give general view of what are the steps should be taken.

3.2 Project Flow Chart

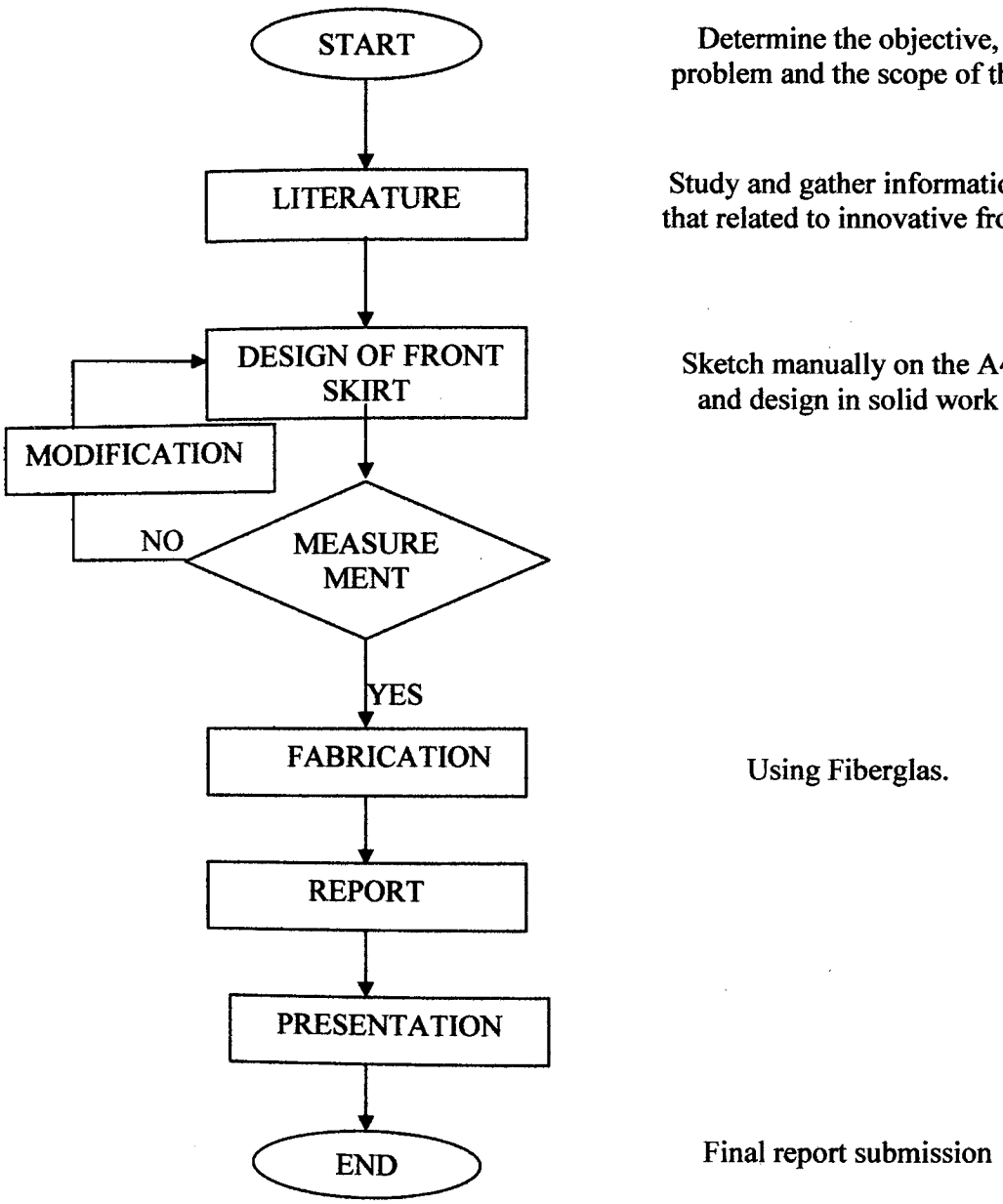

Figure 3.1: Flowchart of the project methodology