

DESIGN OF CAR

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Abstract: The aim of the report is to highlight the final design report of a four-wheeler car with the rear engine system taking only the designer's perspective (Non-Technical) into consideration. To make final product, the design has been divided into sub divisions which are later on integrated into the final rendered model

KEYWORDS: Design, Rear engine system, Perspective, Non-technical, Rendered

I. Introduction

The primary objective is to highlight the optimistic design of a car that could be manufactured for sale while strictly adhering to only designing the part. The secondary objective is to enhance the user comfort, safety, durability and maneuverability of the vehicle by long wheelbase.

I have approached my design by considering all possible alternatives like user persona, vehicle sketching techniques, prototyping (thermocool modeling), and Automotive digital rendering. Based on these techniques, the model is modified and the final design has been obtained. In accordance with these features, it looks upon the aesthetics, safety, ground clearance and wheelbase. Instead of putting front engine system, rear engine system has been introduced.

When a designer looks upon the designing, he targets the particular type of user. He does an ethnographic study of user behaviors along with identifying the market gap. A designer looks upon the following marketing effects of the products which are: advertisements, trust, phases when they are getting launched, specification provided for particular car, age group, sale value, and off road or on road vehicle. These marketing effects are the value points for a designer because marketing techniques helps the product to rise over the time. In accordance with these features, it looks upon the aesthetics, safety, ground clearance and wheelbase. Instead of putting front engine system, rear engine system has been introduced.

II. User Persona

While considering my work, I have preferred to look upon middle class people's comfort level. I have taken an example of a corporate person with a nuclear family. The person

stays near his workplace and hence doesn't use his car for long distance. Once in a month or so, he goes on a trip or to his relative's place. Indirectly it informs you that he is an average user of his car. For a corporate person, a luxury sedan can be comfortable enough to buy. That's why it is mainly used by executives and business class people.

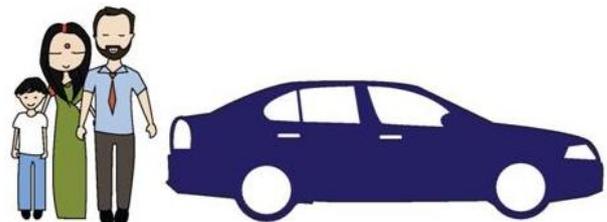


Figure 1: An Example of a corporate person

III. DESIGN OF VEHICLE

The design section of report is divided into 3 major parts:

- Vehicle system sketching
- Hard prototyping (Thermocol modeling)
- Rendered Three dimensional model (Result)

Based on the design objective of performance and safety of the user, optimistic look, the design has been made under the guidance of EXPERTSHUB TEAM and meeting the criteria to have a successful design. For the successful design, alternatives have been considered by looking at the designer's perspective and not considering the technical work.

IV. Frame Design

The design of frame has been divided into two major views to get better view of the technical requirement. Principle aspects of chassis has been focused on during design includes safety, performance and packaging of vehicle system. In the design mainly it has been looked upon user safety and comfort level because as a designer other prospects can't be highlighted.

V. Design

Sketching

In the design, the main components has been divided into two major parts taking first the front view (cockpit) front frame design and chassis design etc. and second rear view of vehicle which include the engine system itself. Both the blocks are separated by a firewall separating them. The frame model can be viewed as -

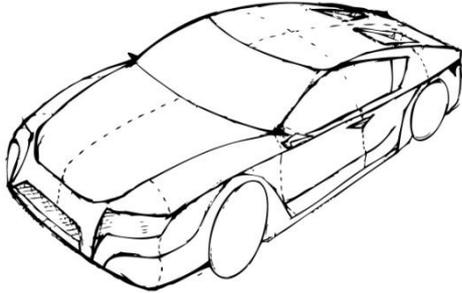


Figure 2: Front View

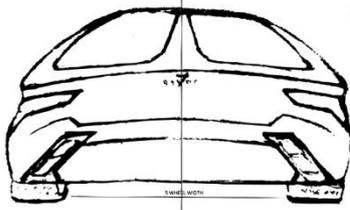


Figure 3: Rear View

During the design of system, Pillar B has been blacked out. Rigidity of frame has been reduced and top surface of front panel has been supported by back panel. Usually pillars are vertical or near vertical supports of four wheeler windows designated by A, B, C or D which is counted from front to rear in profile view. But here in the design, pillar B has been blacked out because it impedes air flow when windows are down. Year old tradition that all vehicles have got B pillars with which a mark is in between the front and rear windows.

We can say it would be best with windows roll down and stereo blasting and that can be made possible by removing the B pillar and that's why it has been blacked out. Designing has been considered by taking the following into consideration:

Safety Harness

For a user to maintain safety, attaching seat belts to chassis provides reliability of seat belt under extreme force. It gives ample time for quick release seat belt which allows coming out of vehicle.

It has the property to avoid crash in all sorts of situation like blind spots or simply backing out in a busy parking lot. Safety features also include forward collision warning with or without auto brake, backup cameras, lane departure

warning and lane keep assist will help car on right track to move.

Weight

The weight of vehicle system should be of top priority, when it requires efficiency. Vehicle weight is a large factor in vehicle performance. Frame being the largest and heaviest component, so it has been advised to use less of front of frame as possible. Hence pillar B has been blacked out, so special attention has been given in placing frame design. The logic behind reduced weight consisted of less number of pillars and correct light weight material for good product.

Aesthetics

The design is made by more rounded corners than straight because the rounded corners gives a pleasing look to the vehicle's body and even less number of welded joints and corners are used in car. The lack of sharp edges allows the design of better streamlined body panel.

It looks pleasing and has a positive effect on the overall aerodynamic drag force. It also gives a 3-D view of the product and sketching provided gives the visual picture of what frame would look like after sketching.

We all have seen big luxurious cars having low ground clearance and this is due to giving optimum focus on drive and handling part of the car

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Hard Prototyping (Thermocol Modeling)

The basic of designing is verified by making hard prototype model object of car. It gives the feel of real product. Here are the some views of model:



Figure 4: Front View

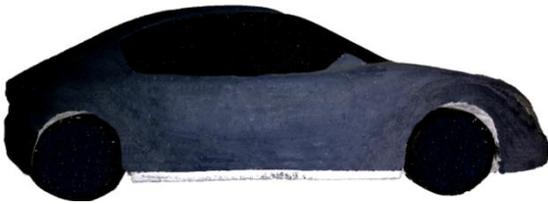


Figure 5:Side View

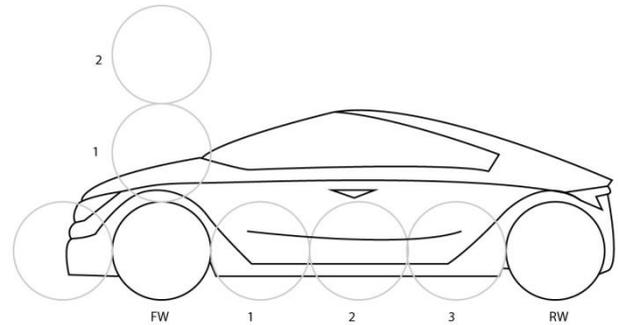


Figure 7:Ground Clearance and Wheelbase

VI. Rear Engine System

Rear engine system is the one which puts weight over drive wheels. The vehicle weight driven rear axle supports rear tires in maintaining traction when it is accelerated and turned. People suggest front engine system for maximum passenger space but only at the cost of ultimate handling where people might even think for middle engine system which has got better handling system but it doesn't have rear seats. So rear engine should be preferred.

The rear engine helps in braking because with weight in back pushing down on rear axle and counting vehicle tendency to move forward which provides greater portion of braking force. It allows front brake to be effective and also lasts longer.

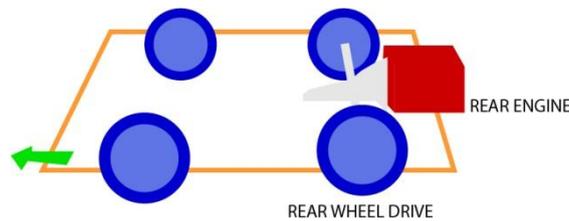


Figure 6:Rear Engine Vehicle System

The effect of longer wheelbase on longitudinal acceleration is analogous. All inertia forces act through the vehicle's gravity, so having large distance between the inner and outer wheel has the same effect as lowering the C.G. reduced load transfer. Reduced load transfer will result in more balanced tractive forces at each tire.

When it comes to comfort level, it is said that, more the wheelbase lesser the bumps we feel. Longer wheelbase makes a more stable car. The configuration provided for design is 3.25 wheels.

Final Packaging

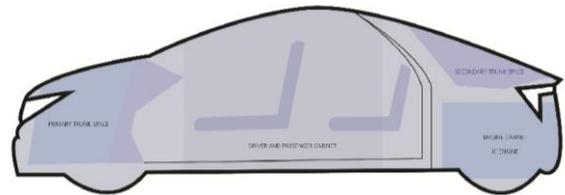


Figure 8:Packaging of a Car

VII. Ground Clearance And Wheelbase

In a place like India where high ground clearance is provided because of road system, a car with high ground clearance can sometimes feel like a body roll. While a car with low ground clearance helps in lowering down the centre of gravity of a car, it adds up to better handling practice. We all have seen big luxurious cars having low ground clearance and this is due to giving optimum focus on drive and handling part of the car. I have provided ground clearance of 0.25 wheels which is quite low because we now have comfort, performance and security.

Rendered View

After completion of design, final three dimensional views have been made.



Figure 9:3-D Rendered Model

VIII. Conclusion

The main goal was to simplify overall design to make it more light weight without sacrificing the efficiency and the performance. The designing has provided me a platform to explore designing. My approach was to design an optimized vehicle so that it doesn't look over designed and accessible for middle class people.

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