A COMPARATIVE STUDY OF FACTORS INFLUENCING AERODYNAMIC DRAG RESULTING FUEL CONSUMPTION IN DIFFERENT MODEL OF AERODYNAMIC VEHICLE

THESIS

Submitted in fulfillment of the requirement for the award of the degree of

DOCTOR OF PHILOSOPHY
(In Mechanical Engineering)

BY

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2007

TITLE OF Ph. D THESIS: A Comparative Study of Factors Influencing Aerodynamic Drag Resulting Fuel Consumption in Different Model of Aerodynamic Vehicle - 2007

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ABSTRACT

Any moving object through a fluid experiences a force in the direction opposite to the motion which is due to the pressure and shear forces on the surface of the object. If we resolve the resultant force in the direction of flow and normal to the flow then these are termed as aerodynamic drag force and aerodynamic lift force respectively. In the present work drag force is calculated on the body of four different car models, theoretically and experimentally. On the basis of our findings experimental drag force is larger than the theoretical drag in each case , reason is that in theoretical findings the effects of side span and wave formation due to sudden change in shape on drag force have not been considered. Whereas in experimental results the above two effects have been included. It is clear from the graphs and tables the vehicles are subjected to much higher drag forces on all surf aces at higher speeds, hence the speed should be limited. The results support restricting speeds of vehicles below 30m/s.the major effect on drag force is due to the angle of wind screen. It is clear from our finding that the drag force for a particular speed increases with the wind screen angle. We see that the variation of drag force is remarkable for angles 60 degree to 85 degrees. This happens due to direct hitting of air on the surface for the angle greater than 60 degree. The practical consequence is to avoid wind screen inclination of 60 degrees and higher, but the lower value of wind screen angle is limited by the larger length of vehicle body. Larger length will increase the material cost of vehicle .therefore, it is advisable the angle of wind screen should be lie between 30 degree to 60 degrees. A larger angle of wind screen, although will reduce the size of vehicle but at the same time it will increase the drag force and the performance of the vehicle will be affected considerably during whole life of the vehicle. The owner of the vehicle will pay extra money to overcome this larger value of drag force. As the power of a vehicle is the product of force and velocity, both these two factors are equally responsible to increase the cost of a vehicle. The larger value of drag force and speed of air will increase in the major loss in performance of vehicle; therefore vehicle engine will consume more fuel. As per our findings at 30 m/s vehicle speed and 80 degrees angle of wind screen, fuel consumption of the vehicle is approximately increased by 200gm/hour for Tata Sumo car. Our results supports that the Maruti Esteem car is more suitable as compared to other cars.