CERTIFICATION OF APPROVAL

Drag Reduction on How to Improve Fuel Consumption of a Vehicle

by

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Approved by,

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CERTIFICATION OF ORIGINALITY

This is to certify that I am responsible for the work submitted in this project, that the original work is my own except as specified in the references and acknowledgements, and that the original work contained herein have not been undertaken or done by unspecified sources or persons.

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ABSTRACT

Automotive aerodynamics is the study of the aerodynamics of road vehicles. The main concerns of automotive aerodynamics are reducing drag (though drag by wide wheels is dominating most cars), reducing wind noise, minimizing noise emission, and preventing undesired lift forces and other causes of aerodynamic instability at high speeds.

The aim of this project is to provide a study on the aerodynamics profile of a vehicle (Perodua Viva) and ways to reduce drag to improve its fuel consumption. The methods used to reduce the drag are by tapering the rear, covering the wheel wells and also by having a smooth, lowered underbelly. A drag coefficient is a number that indicates the car's aerodynamics smoothness. A bigger, bulkier car often has higher coefficient of drag. Higher drag coefficient causes the car to do more work when driven. More work done by the engine causes more fuel to be burned. Often we see that for two vehicles with the same engine capacity driven at the same speed, the car having bigger coefficient of drag will consume more fuel.

In order to achieve the lowest fuel consumption as possible, the car will undergo several modifications that will reduce its coefficient of drag, thus reducing the engine's need for more fuel.

This project is also performed as part of the Perodua Eco Challenge Competition, where institutes of higher learning are given a Perodua Viva each, and they are required to modify them to obtain as little fuel consumption as possible. The team which records the most distance travelled using only a litre of fuel is the winner.

Overall, the project has achieved a reduction of drag of about 22% and the fuel consumption improves from 18.9 km/l to 25.7 km/l.

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LIST OF ABBREVIATIONS

C_d	Coefficient of Drag
C_L	Coefficient of Lift
PEC	Perodua Eco Challenge
CFD	Computational fluid dynamics
AWTE	Automotive Wind Tunnel
NSMB	Navier-Stokes Multi-Block
UTP	University of Technology Petronas
C_p	Coefficient of Pressure

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