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MODERN AERODYNAMIC TECHNOLOGY ON MOTOR ROAD VEHICLES

ABSTRACT: When designing vehicle bodies it is essential to reduce the air resistance in order to improve fuel economy and performance while driving. Interest in the new technologies, to reduce air resistance, has become more and more significant due to the fact that the drag force increases with the square of speed, while engaged power requirements need cube speed of vehicles. This paper provides an overview of modern aerodynamic instruments (vortex generators and directed air streamlines) which can be mass-used in passenger and freight transport in particular and affect achievement of the automotive designer's goals.

KEY WORDS: Aerodynamic, vortex generators, directed air streamlines, road motor vehicles

INTRODUCTION

With the development of new composite materials, vehicles are becoming lighter and forces which act through the tires on the ground do not create a big rolling resistance but some form of lifting forces [1]. Besides the reduction of the air resistance, aerodynamic details and vehicle design can create force that will operate through the car wheels on the road and create better traction. Vehicles are better controlled during slippery and wet road driving and aquaplaning possibility is eliminated [2]. The question is how different vehicle additives can affect car aerodynamics. A compromise must be established between low air resistance and negative lifting force. Optimal balance between these forces depends not only on specific vehicle design but also on added body parts. The example of detail optimization is shown in Figure 1 with minor modifications of the front vehicle body (A), hood (B), front pillars (C) and last columns forms (D and E) and with the total drag coefficient reduction (C_x) of 21%. Recent studies of the aerodynamic drag reduction present innovative technologies such as vortex generators and directed air streamlines. Both deserve explanations because of fuel consumption savings and better vehicle handling.

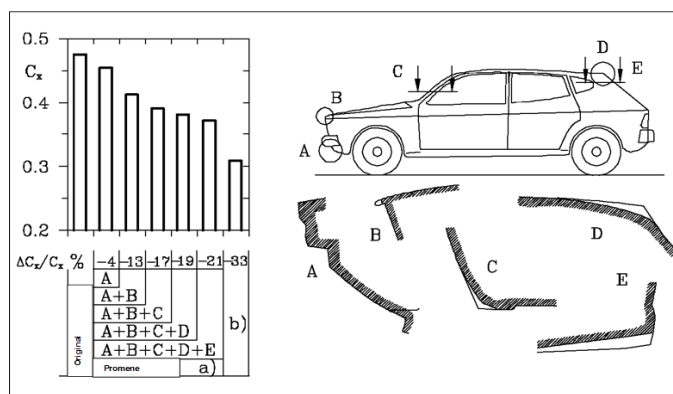


Figure 1 Optimization of car details [3]

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