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Advances in Automobile Engineering

Perspective

Design and Manufacturing of Vehicles in Aerodynamic Shape

Klauce Laurence*

Department of Automatic Control, Polytechnic University of Catalonia, Barcelona, Spain

DESCRIPTION

The study of the aerodynamics of road vehicles is known as automotive aerodynamics. Its primary objectives are to reduce drag and wind noise, reduce noise emissions, and avoid unwanted lift forces and other causes of aerodynamic instability at high speeds. In this scenario, air is also considered a fluid. For some racing car categories, producing frictional force may be necessary to improve traction and consequently cornering ability. With increasing vehicle speed, the frictional force of aerodynamic drag increases substantially [1]. Engineers started thinking about car form in terms of lowering aerodynamic drag at greater speeds as early as the 1920s. By the 1950s, German and British automotive engineers had conducted extensive research into the effects of automotive drag on higher-performance automobiles. By the late 1960s, experts had noticed a considerable increase in the sound levels released by cars travelling at fast speeds [2]. These impacts were thought to cause a non-linear increase in the intensity of sound levels for surrounding land users. Soon after, highway engineers began to design routes that took into account the speed impacts of aerodynamic drag-produced sound levels, and automotive manufacturers did the same [3].

Working method of aerodynamics

Let us Consider what would happen if a person drove a car into a brick wall at 65 miles per hour (104.6 kilometres per hour). Metal is prone to twisting and tearing. The glass would be shattered. For protection, airbags would inflate. Even with all of the breakthroughs in safety that modern automotive have, this would be a difficult collision to escape. A car isn't built to drive through a brick wall. However, cars are built to pass through another form of "wall" that has existed for a long time: the wall of air that pushes against a vehicle at high speeds. Most of us do not consider air or wind to be a barrier [4]. Cars have been developed with aerodynamics in mind for decades, and automakers have come up with a range of improvements that make cutting-edge technology possible. This is when the aerodynamics science comes into play. The study of forces and the subsequent motion of things through the air are known as aerodynamics. Cars have been constructed with aerodynamics in mind for decades, and manufacturers have come up with a range of technologies to make cutting through that "wall" of air easier and have less of an influence on daily commuting. Because the engine doesn't have to work nearly as hard to push the car through the wall of air, a car constructed with airflow in mind has less difficulty accelerating and can achieve better fuel economy results. Engineers have invented a number of methods for accomplishing this [2]. For example, on the exterior of the vehicle, more rounded patterns and shapes are constructed to channel air in such a way that it flows around the automobile with the least amount of resistance possible. Some high-performance automobiles even include components that circulate air smoothly across the vehicle's underbelly. A spoiler, often known as a rear wing, is often used to prevent the air from lifting the car's wheels and rendering it unstable at high speeds [5]. Although, as it'll be seen later, the majority of spoilers found on cars are more for show than anything else.

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Correspondence to: Klauce Laurence, Department of Automatic Control, Polytechnic University of Catalonia, Barcelona, Spain, E-mail: laurence1954@klauce.yahoo.es

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