

An introduction to aerodynamics

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Introduction

Aerodynamics is the study of how air flows around an object. Anything that moves through air is affected by aerodynamics. Air exerts forces on an object through pressure, these forces influence the motion of the car.

The main goals on the study of aerodynamics within the automotive industry are:

- To reduce drag
- To reduce wind noise
- Minimizing noise emissions
- Preventing undesired lift forces

This poster is to give you a little bit of insight on aerodynamics in the automotive world.

Aerodynamic forces

- lift – a vertical force that is perpendicular to the direction of aerodynamic drag which acts either upwards or downwards, typically associated with the force that lifts the front of the car at high speeds.
- Drag – the force that slows down a car, it resists the forward motion of the car. The car moving forward encounters air resistance caused by air pushing against the front, rear, and sides. The resistance increases with speed.
- Side forces – the forces that push the car to the side. A lateral force that is caused by crosswind conditions or when a vehicle is close to another object. This force acts perpendicular to the direction of motion which pushes the vehicle sideways.

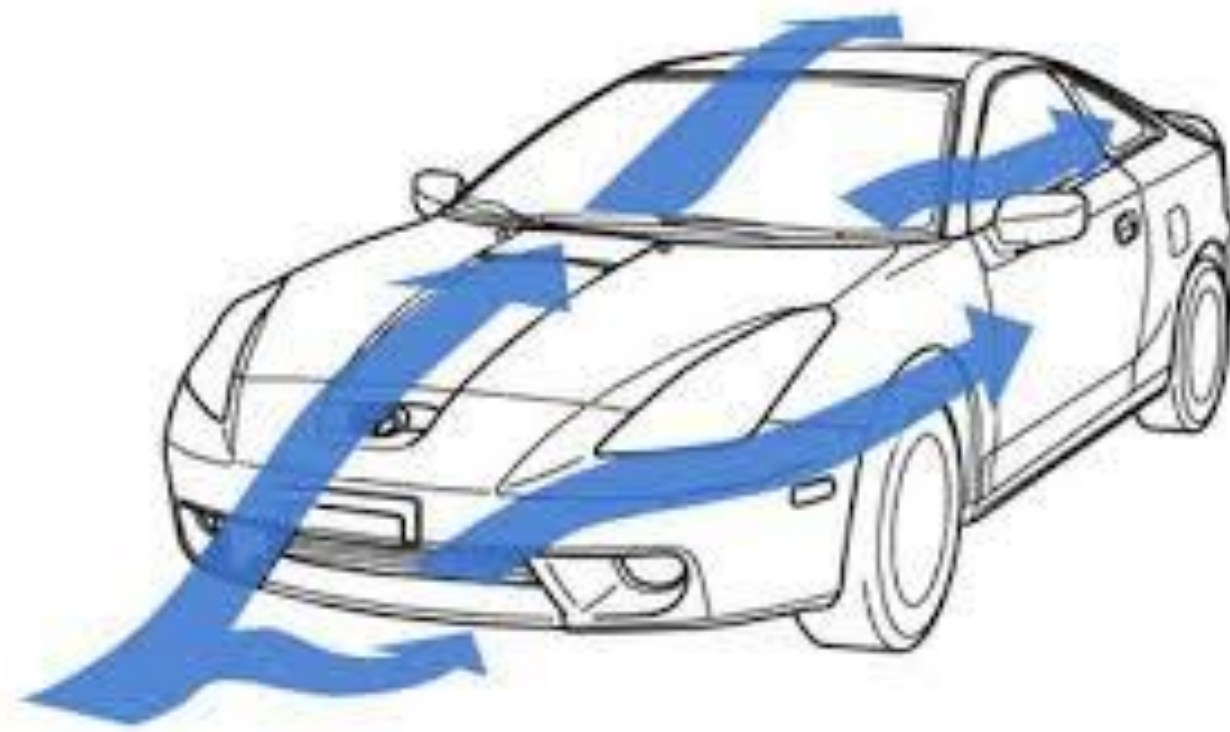


Figure 1 shows the way air moves around a road vehicle.

Formula 1 Evolution Last 50 Years

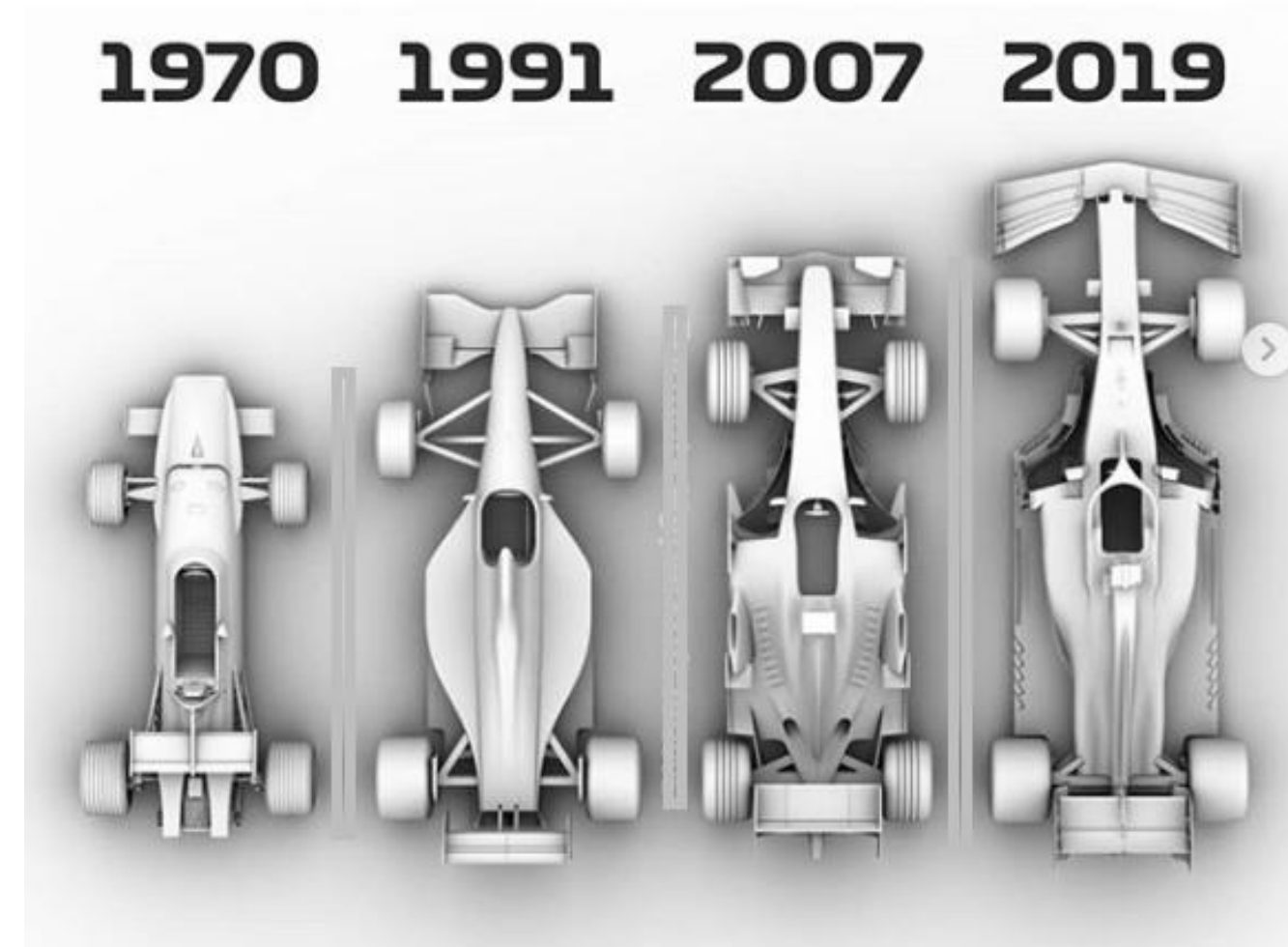


Figure 2 shows the evolution of f1 cars due to research on aerodynamics

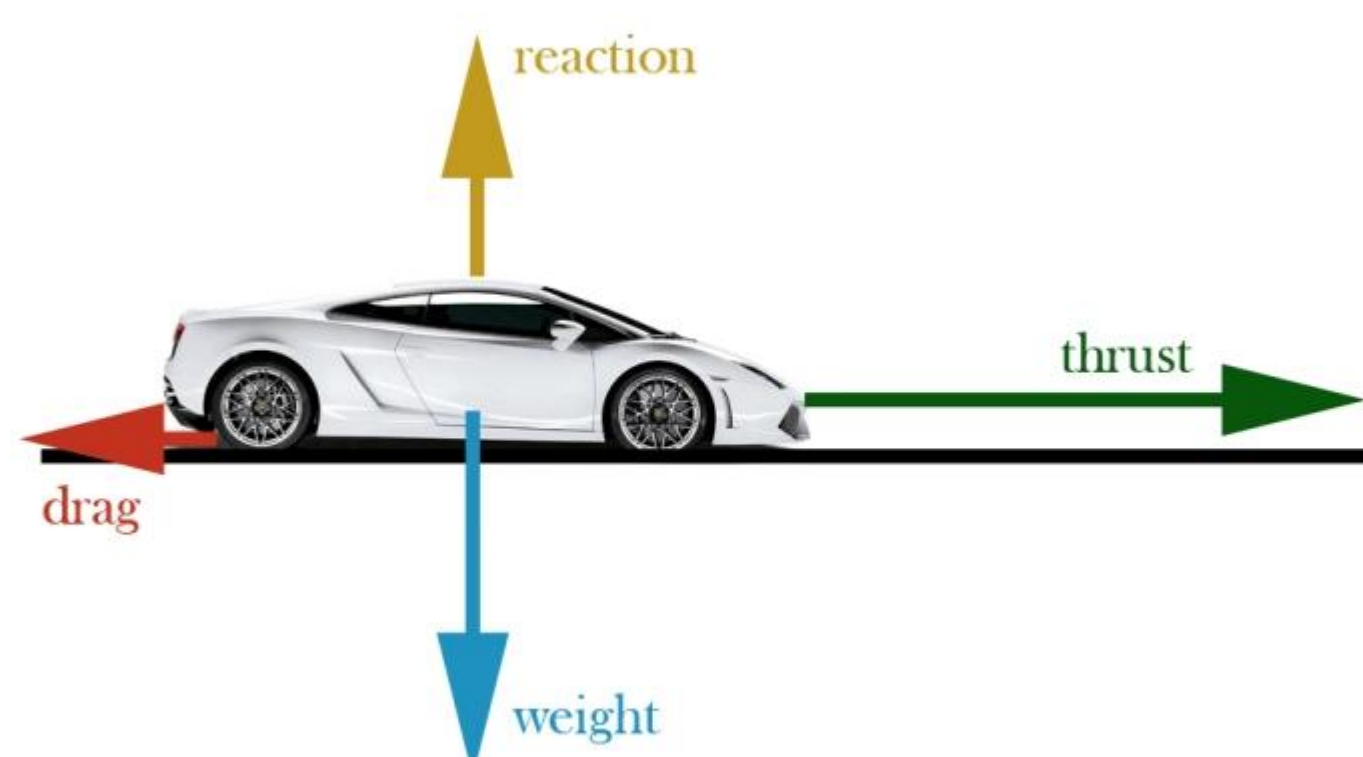
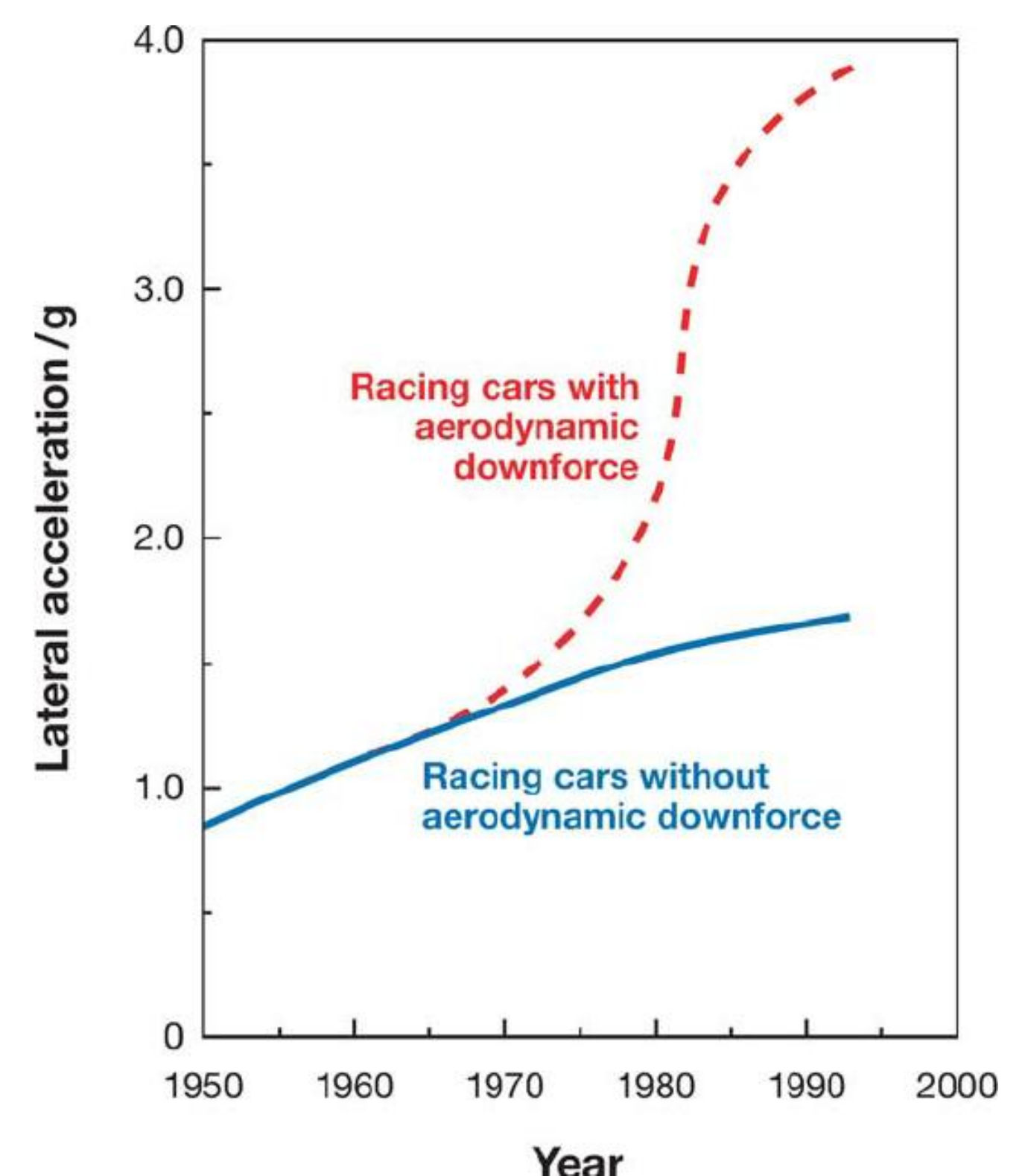


Figure 3 shows the forces acting on a vehicle

Aerodynamics in racing

The way the race cars are shaped and designed can either help maximise speed or it can create drag which slows you down. Race car companies have been trying for years to reduce drag and figure out which shape of a car will help it to maximise speed and performance, this had been shown through decades of research and trial and error of design.

Early designs of race cars that primarily aimed to reduce drag have been evolved to prioritise downforce and enhance stability.



References

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