# AERO 101

Welcome to the first segment of Aero 101! Each week we will cover aerodynamics in an effort to share our knowledge with you, our customers! We will start with the basics, but as the weeks go on, feel free to ask us to explain anything aerodynamic, no matter how general or specific. Let's get started!

Properties of Air

First things first, to understand aerodynamics, we need to know how air behaves. Air behaves like a fluid, and has a viscosity, or "stickiness". Thatbeing said, air will have a tendency to stick to and move along a shape. When air moves across an object, we depict it as a streamline. Streamlines that follow the exact shape of the body depict air that is attached. Where the streamlines don't follow the shape, we say it is separated, or detached. Generally, you want the air flow to be attached as much as possible, to decrease aerodynamic drag and/or increase downforce.
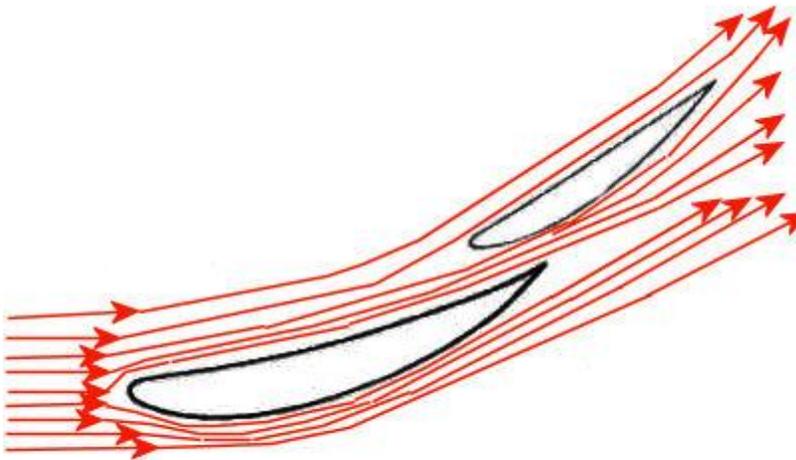
Airflow

Next, we will talk about airflow. When the airflow is parallel and follows the direction of average velocity, this is called laminar.

On the other hand, if the flow is erratic, even if the airflow follows the direction of average velocity, it is considered turbulent. There is also a boundary layer surrounding the car, which is caused by the velocity parallel to the car's body reaching the outer velocity. Remember when we said that air is viscous? Well as you move towards the back of the car, the boundary layer, which usually begins as laminar flow, becomes turbulent. As airflow becomes turbulent as you move to the rear of the car, the boundary layer thickens too. A thicker boundary layer creates more drag.

Turbulence isn't always a bad thing however. A turbulent boundary layer helps delay flow separation, in the case of sedans and high camber wings. In conclusion, to reduce drag, you want to maintain as large a region of a thin boundary layer as possible, except where flow separation is likely to happen, in which case you want a turbulent boundary layer.

Strömungssimulation eines F1-Wagens, berechnet mit ANSYS Software.
ANSYS ist Official Supplier des BMW Sauber F1 Teams.