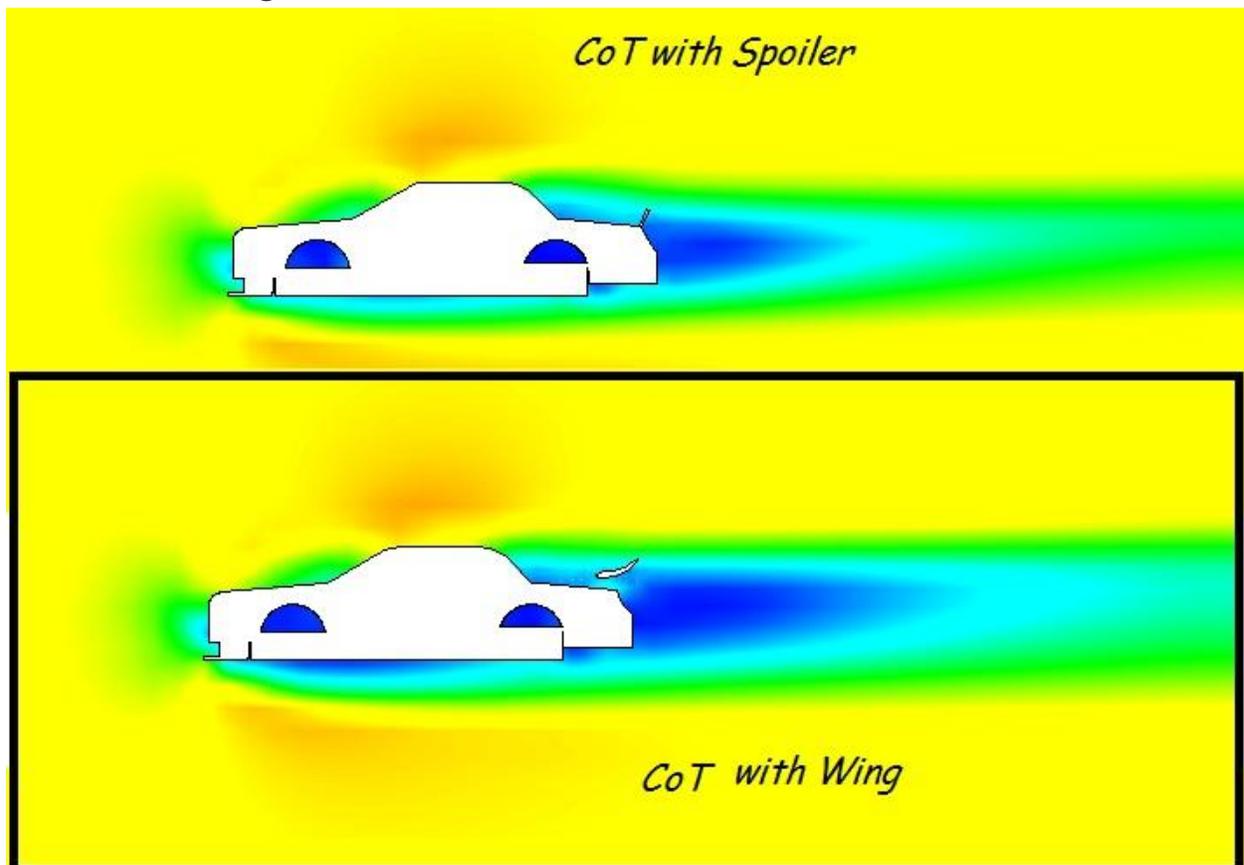


AERO 101

Welcome to the third segment of Aero 101. This week's topic is rear spoilers and airfoils/wings. Both these devices help shift the aerodynamic balance rearward, and improve rear grip. If you have specific questions regarding rear spoilers and wings, please post below!

Rear Spoilers

A rear spoiler, unlike a wing, is continuous with the bodywork of the car. A rear spoiler slows the airflow over the rear deck and elevates the stagnation point, which increases the static pressure in that region. Also, the direction of airflow is also altered, by deflecting it upward. Both the change in static pressure and transfer of momentum from the airflow create downforce. The greater the pressure gradient between the top of the car and the bottom, the larger the downforce created.



However, adding a rear spoiler also has some setbacks. Remember in the last segment, where it was stated that low pressure behind the car creates drag? Well, a rear spoiler increases the wake and this low pressure region, generating more drag. This stronger low pressure region affects the underside of the car too. Air flowing under the car is pulled into the low pressure region, generating downforce. As it exits from underneath the car, the air is pulled upward by the rear spoiler. This is what is known as upwash. Changing the angle of attack and length of the spoiler will affect how much downforce and drag are created. At a specific length and AOA, drag can actually be reduced. This would be determined through CFD or wind tunnel testing.

Rear Wings

A wing is a body shaped so that its motion through the air creates lift, or in this case, downforce. These days, wings are cambered, meaning one of the surfaces (top or bottom, depending on how you look at it), is more curved than the other surface. Cambered wings create more downforce than symmetrical wings. The trailing edge of a cambered wing has the largest effect on downforce. Because of this, the lift can be changed without changing the angle of attack, simply by changing the shape of the wing. Too high a camber, however, causes flow separation and a form drag will result. The same thing happens when you have too high an angle of attack (AOA). The size of the wing (chord, thickness, and wingspan) also determine how much downforce can be produced. Generally, to reduce drag, a skinny wing is better than a thicker wing. There are a lot more to wings than what I've explained here, but we'll cover that in the next segment.

