

AERO 101

Hello and welcome to the sixteenth segment of Aero101. Today, we will discuss the many elements of a Formula 1 front wing. Since it precedes the whole car, it is a very important aerodynamic device.

The front wing has 5 main components: the mainplane, endplates, main & upper flaps, cascades, and turning vanes. The mainplane is the main front wing element and has an airfoil shape. The shape of the mainplane is determined via CFD and wind tunnel testing. It is secured to the nose via 2 pylons. Next are the main & upper flaps. Nowadays, the mainplane and flaps are incorporated into 1 piece, with slot gaps to allow air underneath the wing. There are usually between 3-5 “elements,” as they are called. The elements merge on the outside before they reach the endplate to form a turning vane. This helps direct airflow away from the path of the sidepods and around the tires. The elements are packed towards the outside of the front wing, to keep turbulent away from the sidepods.

The front endplates have a similar function to that of a rear wing endplate. They prevent the pressure from the top of the wing from spilling over to the underside, and also help direct airflow around the tires, which create a lot of drag. The design of the endplate differs from team to team and usually depends on how they want to control the airflow around the tires. Attached to the endplates are small cascade “winglets”, which are little tiny wings that create more downforce and help guide airflow over the tires. If you can't tell, airflow around and over the tires is a very big issue! Lastly, are the turning vanes. These are located all over the front wing (on the flaps, on the endplates, underneath the wing) and direct airflow to different areas.



Source: Haynes RBR F1 Owner's Workshop Manual (RB6)