

The Development of Active Air Skirt for reducing Drag Force

**Jinyoung Yoon¹⁾ Soobok Kim¹⁾ Nakkyoung Kong¹⁾ Hongheui Lee¹⁾ Dongha Kim¹⁾ Haklim Kim¹⁾
Jaesup Byun²⁾ Jangho Kim²⁾**

1) Hyundai motor company, Advanced Body Development Team

150, Hyundaiyeonguso-ro, Namyang-eup, Hwaseong-si, Gyeonggi-do, Republic of Korea (E-mail: yjy96kr@hyundai.com)

2) Hyundai Mobis company, Modular Convergence Design Team

17-2 Mabuk-ro 240beon-gil, Giheung-gu, Yongin-si, Gyeonggi-do, Korea

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In the automotive industry, an active aerodynamic system is a technology in which a variable mechanism is applied in order to efficiently control and reduce the driving resistance of air generated during driving in order to increase fuel efficiency or fuel efficiency of a vehicle. In particular, as the proportion of batteries increases due to the characteristics of electric vehicles, the weight of vehicles increases significantly compared to existing internal combustion engines. Accordingly, the need for an active aerodynamic system is continuously required to improve fuel efficiency of an electric vehicle. Active aerodynamic system includes an active air flap, an active rear spoiler, an active air skirt (dam), There is an active rear diffuser. Here, we are going to explain the development of the technology for the active air skirt. Active Air Skirt (AAS) serves to improve fuel efficiency by reducing the resistance of air flow in the lower part of the front bumper according to the driving conditions of the vehicle. A shape like a bumper lip should be applied to the lower part of the front bumper to improve the drag of the vehicle. Depending on the specifications of the vehicle, The drag improvement effect can be maximized only when it is lowered to the level of 70~120mm. There is a difference in the shape of the skirt between ICT and EV vehicles, but in the case of electric vehicles, the under floor is fully flattened, so the shape of the skirt is unnecessary at the center (see Fig. 1/2). The longer the fixed skirt is in the direction of 'H', the higher the risk of damage due to the limitation of ground height and approach angle. LDT (Light Duty Truck) vehicle certification vehicles have a high approach angle and ground clearance regulation, which makes them worse in terms of aerodynamics. Therefore, applying active air skirts to deploy/store them according to vehicle speed can solve package & certification restrictions. The shape of active air skirts to improve the flow under electric vehicles and reduce the resistance of tires itself can be solved. We defined factors as skirt height, width, Similar air resistance improvements were found in vehicles with electric vehicle platforms, and C_D (Coefficient Drag) was found to be more effective in vehicles with relatively short front overhangs and a larger approach angle compared to the same overhangs. Tire wheel size and AAF (Active Air Flap) close/open As a result of the actual car evaluation, it was found that the tire wheel size was large and the effect of the skirt was maximized when the AAF opened. It was confirmed that the greater the tire wheel resistance and the greater the cooling resistance, the better the drag improvement effect of the active air skirt. Through the development of active air skirts to improve the fuel efficiency (aerodynamics) of the EV platform, we were able to obtain the following.

- (1) Improve the layout of the vehicle package and maximize the degree of freedom in design under the front bumper.
- (2) The optimized shape of the active air skirt specialized in the EV platform was implemented through principle evaluation, and the actual vehicle implementation was verified with parts. The aerodynamic effect was improved by 14 counts.
- (3) Fuel efficiency was improved by 2.24%. Improvements in electronic load of 94W and AER of 5.6MILE were achieved.



Fig.1 AAS skirt shape of ICE



Fig.2 Skirt shape factor of EV

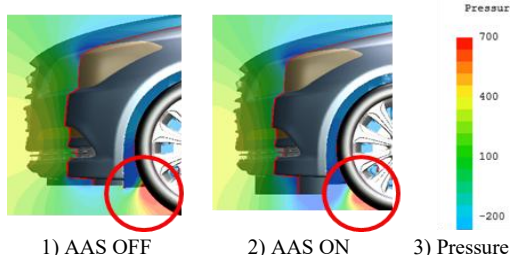


Fig.3 Pressure Distribution in the Tire Area