Saving fuel with aerodynamic fittings

Air resistance has a major impact on fuel efficiency and can account for as much as a third of fuel losses on a typical long-haul operation. At Volvo Trucks, additional aerodynamic fittings are developed through in-depth simulation work, as well as comprehensive tests in a wind tunnel and on the road to ensure the greatest possible fuel savings. They can reduce air resistance by anything from 1-25%, depending on the package combination, with a collective fuel saving potential of up to 10%, depending on the air deflector package, cab, superstructure and equipment.

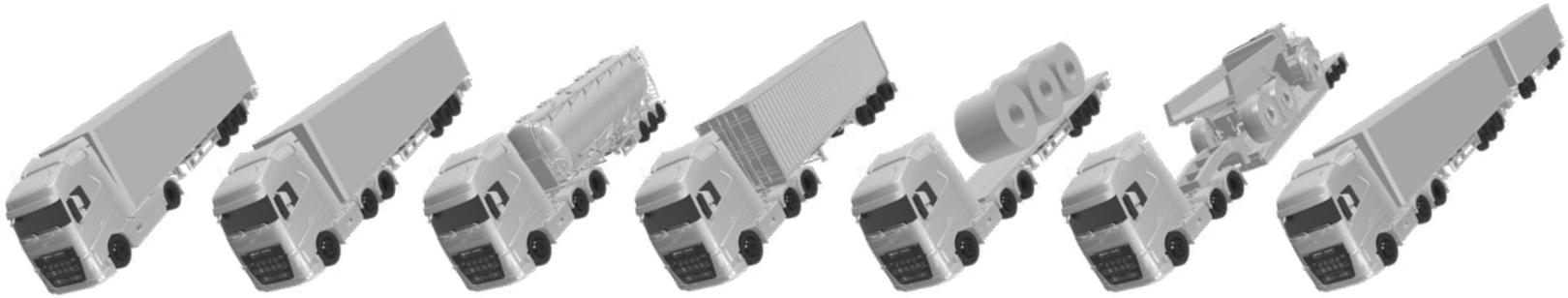
In most types of operations, there is no doubt that, along with your choice of tyres, the aerodynamic fittings you choose will have one of the biggest direct influences on your truck's fuel consumption and, in turn, its CO_2 emissions. Other very important factors for fuel consumption and CO_2 emissions are the driveline efficiency, driving behaviour/training and vehicle speed.

In this guide, you will find some of the elements that you as a transport owner or operator should consider when choosing aerodynamic fittings. It is intended to give an insight into the most common considerations, but it does not cover aerodynamic devices for all possible transport assignments. Which fittings to choose for your transport operation is best discussed with a salesperson at your local dealership.

Roof spoilers and cab side deflectors for different truck configurations

The type of trailer used in your daily operations will have an impact on how your aerodynamic devices work. For example, when combined, simulations show that the cab roof spoiler and cab side fenders can reduce fuel consumption by as much as 4 percent in a typical long-haul operation with a standard box trailer configuration. In other operations with different types of trailers the simulation results vary, but it is clear that they still have a positive impact and save fuel.

This generally applies to any type of cargo, and even includes tanks, which are typically smaller than the cab. This is because when the air flow is released from the back of the cab, it is sucked into the gap between the cab and the cargo, creating significant air resistance. To shelter a non-aerodynamic load from this air pattern, a roof spoiler and side fenders are necessary.



Type	4x2 Tractor with trailer	6x2 Tractor with trailer	Tanker	Container	Flatbed	Flatbed oversized	LHV
Roof spoiler & cab side fender maximum fuel savings	4%	4%	3%	7%	6%	5%	3%

Adjusting the roof spoiler for different trailer structures

The roof spoiler is the single most important aerodynamic device for reducing fuel consumption and must be correctly adjusted to gain full potential. Depending on the specific cab and trailer/superstructure, the potential fuel savings for a well-adjusted roof air deflector could be up to 7 percent, compared to the least optimal setting. Ideally, it should be factory fitted from the start. To optimise the position of the roof air deflector in relation to different cabs and trailers you will also need to ensure that:

- **The truck is parked on a level surface.**
- **The tyres are inflated to the correct pressure.**
- **If the truck has air suspension, it must have the correct working pressure in the pneumatic system.**
- **The cab suspension must be intact.**
- **Neither driver nor passengers should be in the cab while setting the spoiler position.**

Your Driver Guide will show how to adjust the spoiler to suit the load you are carrying. However, if your superstructure is not a van body trailer, the driver guide may not provide a full instruction on the optimal setting. In this case, the roof deflector should be set in a position that it is as low as possible, but never at a lower height level than the highest significant point of the superstructure (i.e antennas or similar protrusions should not count in the superstructure height).

Air resistance and the need for speed

Aerodynamic resistance is present at essentially any vehicle speed. Anyone that has struggled to exceed 30 km/h on a bicycle has experienced that aerodynamic resistance is very real even at low speeds.

Aerodynamic resistance increases progressively with speed. To be exact, when speed doubles, aerodynamic resistance increases by 4 times. If speed increases 3 times, aerodynamic resistance increases by 9 times, and so on. As a general rule, aerodynamic fittings therefore start to make a significant impact on fuel economy when a truck's average speed exceeds around 40-50 km/h. This is also when aerodynamic drag starts to have the same or a similar impact on fuel as rolling resistance. It is therefore essential to consider the average speed of your truck in your daily operations. For long-haul transport companies, aerodynamic fittings are an obvious choice, but for slower urban distribution operations, with many starts and stops, it is less likely they will have a justifiable impact on fuel consumption.

In some sectors, such as construction or tipper transport, the decision is not so straightforward. For example, for heavy duty construction trucks that perform repetitive manoeuvres at low speed and rarely leave the building site, aerodynamic devices are unlikely to be worthwhile. However, some construction trucks and tippers spend considerable time on the motorway when collecting or disposing building material. In these cases, aerodynamic fittings could offer significant fuel savings. The conditions on the route also need to be factored in. You need to consider whether your truck travels on slower, hilly routes or in heavy traffic, or on main roads and motorways where higher speeds are possible.

The weight debate

With today's tight transport margins, it is understandable that some operators are concerned that aerodynamic fittings will add weight to their truck, thereby reducing its potential payload. This is especially relevant in tank transport where the payload income is directly linked to the transported weight and commission per kilogram.

Balancing out what is more important will depend on the overall weight, route and average speed of your operation. If your truck is travelling at higher speeds, fuel savings will be significant and may outweigh the benefits of a slightly increased payload. Some tank transport companies now place greater importance on saving fuel and lowering CO_2 emissions – not just to meet increasingly stringent regulations, but also because they want to do what they can to help reduce environmental impact.

Other aerodynamic fittings and how they save fuel

Bumper spoiler

- Diverts accelerated, high speed air flow to the sides of the vehicle so it does not encounter the uneven structure of the truck underside.
- Still allows for adequate ground clearance.
- Acts as an integrated front wheel spoiler

Chassis skirts

- Tailored to their respective wheel base to lower air resistance and shield bulky and unsightly components on the chassis sides.

Fender flares

- Addresses the area between the wheel and wheel arch where a highly turbulent, swirling flow of low speed air from the rotating wheel meets the higher velocity structure of the flow outside.

Truck accessories and aesthetics

Externally fitted parking coolers and popular accessories such as extra lights, bull bars, top bars and air horns will detract from the aerodynamics of the truck and increase fuel consumption.

Finally, it is worth noting that aerodynamic fittings can greatly improve the aesthetics of a truck. Smoother, cleaner lines and fittings in the same colour as the truck bodywork will always add to its overall appeal and design.

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