

Using a streamlined profile tractor with aerodynamic devices will reduce fuel costs by over \$800 per year and eliminate over five metric tons of greenhouse gas emissions compared to a classic profile tractor.

What is the challenge?

Aerodynamic drag (wind resistance) accounts for most truck energy losses at highway speeds. Reducing drag improves fuel efficiency. The longer the drive and the higher the speed, the greater the potential efficiency benefits. Manufacturers made significant progress over the past two decades in reducing the drag coefficient (a measure of wind resistance) of a typical freight truck from about 0.8 to about 0.65 – an improvement of nearly 20 percent. Additional efforts to improve aerodynamics could result in a further 20 percent reduction in the drag coefficient. This could have a significant impact on fuel economy. For example, cutting drag by 25 percent could raise fuel economy up to 15 percent at highway speed.

What is the solution?

A number of options exist to improve aerodynamics and improve fuel efficiency.

Tractor Aerodynamics

Truck tractor aerodynamic options include roof fairings (an integrated air deflector mounted on the top of the cab), cab extenders (known as gap seals, which reduce the gap between the tractor and the trailer), side fairings, and a front bumper air dam (to reduce air flow beneath the truck). Truck manufacturers offer aerodynamic models that include a streamlined front profile, sloped hood, and a full package of add-on devices. These tractor models can improve fuel economy by up to 15 percent, when compared to similar models without aerodynamic devices. For a typical combination truck, improving aerodynamics by 15 percent would cut annual fuel use by up to 2,430 gallons and save up to \$3,644 in fuel costs.

Trailer Aerodynamics

Trailer aerodynamics can be improved minimizing the gap between the tractor and the trailer, to reduce air turbulence. Specifying wheelbase and fifth-wheel settings that position the trailer as close to the rear of the tractor as possible can reduce tractor-trailer gap. Reducing trailer gap from 45 to 25 inches could improve fuel economy as much as 2 percent. Another innovative trailer option is to use side skirts. These panels hang down from the bottom of a trailer to enclose the open space between the rear wheels of

the tractor and the rear wheels of the trailer. According to the manufacturers, trailer side skirts can improve fuel economy by up to 5 percent. Cargo “profile” is also important. On flatbed trailers, reduce drag by arranging cargo as low and smooth as possible. Secure loose tarpaulins and close the curtains on empty curtain-sided trailers to improve fuel economy by up to 2.5 percent and 4.5 percent, respectively.

Single Unit Truck Aerodynamics

Many new single-unit truck models incorporate a sloped hood and a more streamlined front profile as a standard feature in order to reduce drag. Rounded air deflector bubbles can be added to single-unit trucks with van-style bodies to reduce drag; manufacturers claim fuel economy benefits of 5 to 10 percent. This would yield annual fuel savings of 82 to 165 gallons, saving \$124 to \$247 in fuel costs. Single unit trucks with higher annual mileage could realize even larger benefits.

The results are in . . .

Using a streamlined profile tractor with aerodynamic devices (roof fairing, cab extenders, and side fairings) can reduce fuel costs by over \$800 and eliminate over 5 metric tons of carbon dioxide per year compared to a classic profile tractor. When installed on van trailers, aerodynamic devices can produce comparable fuel and emission reductions. Some aerodynamic options are standard on many trucks, like a streamlined hood. Others may be purchased and installed for an additional cost. The initial expense of these options is often quickly recouped through fuel savings.

Next steps

Trucking firms should specify aerodynamic options when purchasing a new truck and consider adding aerodynamic devices to existing trucks. In most cases, the cost to purchase the devices is soon recovered in fuel savings. For more information on aerodynamic devices, contact your local truck dealer, truck equipment vendor, or trucking association.