Green Transport Partnership

A Glance at Clean Freight Strategies: Improved Aerodynamics

Better aerodynamics reduces fuel consumption and emissions that are harmful to the environment.

What is the challenge?

An aerodynamic truck tractor with integrated cabroof fairing

Aerodynamic drag (wind resistance) dominates truck energy losses at highway speeds. All vehicles derive a benefit from reducing aerodynamic drag. The longer the drive and the higher the speed, the greater the benefit. Manufacturers have focused considerable attention on improving truck tractor aerodynamics over the past two decades, and the drag coefficient (a measure of a vehicle's wind resistance) has fallen from about 0.8 in 1970 to about 0.65 for a typical truck today. Aggressive programs to reduce drag could result in further 20-percent reduction in the drag coefficient. According to the Department of Energy, a 10-percent reduction in aerodynamic drag results in a 5.5 percent fuel savings at highway speeds.

What is the solution?

A number of options exist for improving aerodynamics and achieving significant gains in fuel efficiency.

Air deflectors on single-unit trucks

Tractor Aerodynamics

Numerous aerodynamic devices are available for truck tractors, including roof fairings (an integrated air deflector mounted on the top of the cab), cab extenders (sometimes called gap seals, which help to close the gap between the tractor and the trailer), side fairings, and a front bumper air dam (which reduces air flow underneath the truck). All major truck manufacturers now offer aerodynamic models that include a sloped hood, streamlined front profile, and a full package of add-on devices. These models can improve fuel economy by over 15 percent, particularly when compared to a "classic" profile tractor.

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Trailer Aerodynamics

Several options exist for improving trailer aerodynamics. According to the American Trucking Associations (ATA):

- Reducing the tractor-trailer gap from 45 to 25 inches will help limit the drag caused by air turbulence and improve fuel economy one to two percent.
- Rounded air deflector bubbles (pictured) can be installed on the front side of van trailers to cut wind resistance and improve fuel economy up to five percent.
- Trailer side skirts-panels that 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-are another innovative option.
- On flatbed trailers, drag can be reduced by arranging cargo to keep the outline of the total load as low and smooth as possible.
- Researchers in Europe have shown that securing loose tarpaulins will improve fuel economy by up to 2.5 percent.
- Closing the curtains on an empty curtain-sided trailer improves fuel economy by 4.5 percent.

Single Unit Truck Aerodynamics

Many new single-unit truck models incorporate a sloped hood and more streamlined front profile as a standard feature in an effort to reduce drag. Rounded air deflector bubbles can also be added to single-unit trucks with van-style bodies to reduce fuel consumption by five to ten percent.

The results are in...

Using a streamlined profile tractor with aerodynamic devices (roof fairing, cab extenders, and side fairings) will reduce fuel costs by $900 and eliminate over six metric tonnes of carbon dioxide emissions per year compared to a classic profile tractor. When installed on van trailers, aerodynamic devices can produce similar fuel and emission reductions. Some aerodynamic options now come standard on many trucks, like a streamlined hood. Others must be purchased and installed for an additional cost. The initial expense of these options are often quickly recouped through fuel savings.

Next steps

Trucking firms should buy optional aerodynamic equipment when purchasing a new truck. Many firms also sell devices that can be added to existing trucks. The fuel cost savings more than outweighs the additional costs of these devices and reduces harmful emissions that can damage the environment. For more information on aerodynamic devices, contact your truck dealer or the ATA. ATA's Technology and Maintenance Council has released publications that quantify the fuel economy benefits of a variety of aerodynamic options.

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