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WHEN IT COMES TO SAVING FUEL, FLEETS HAVE MYRIAD TECHNOLOGY OPTIONS

While an aerodynamic truck is a good start for your fuel-saving journey, other technologies and practices can bring even more improvements.

BY MIKE ROETH

SHELL
LUBRICANT SOLUTIONS

> **A 10% ANNUAL REDUCTION** IN IDLING IS WORTH 1% IN FUEL ECONOMY, WHICH **TRANSLATES TO ABOUT $500–700 ANNUALLY** FOR A TRUCK TRAVELING 100,000 MILES A YEAR.

Starting with a tractor and trailer that are specified to be as aerodynamic as possible is the first step in optimizing freight efficiency. However, that should not be the end of a fleet's efforts to wring the most out of a gallon of fuel. There are many other technologies that can be added to a vehicle that will result in incremental increases in fuel economy.

Powertrain possibilities

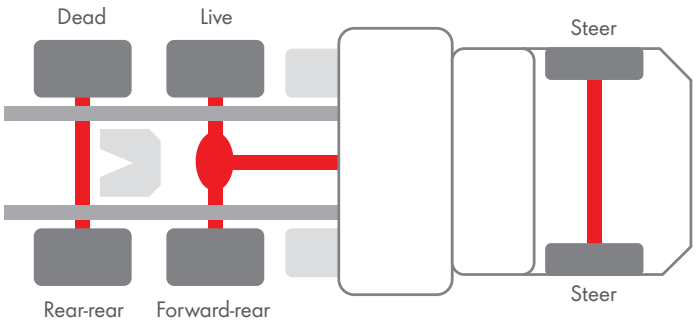
One of the biggest areas for further fuel economy gains is optimizing the powertrain. While engine parameters have been accessible since the advent of electronically controlled diesel engines in the mid-1980s, not all fleets are using them to optimize their vehicles for fuel efficiency.

Today, fleets can set more than 100 different parameters, many of which can benefit fuel economy. In its Confidence Report on Programmable Engine Parameters, the North American Council for Freight Efficiency (NACFE)[1] found that fuel economy improvements of 5–8% are possible for fleets if they optimize all parameters for fuel economy. Meanwhile, improvements of 3–5% over the default may be available to fleets that simply set the parameters of their new trucks in a few key areas, such as vehicle speed and idle reduction.

"Downspeeding" is another powertrain-focused strategy for improving fuel economy in heavy-duty trucks. In downspeeding, the numerical rear gear ratio is lowered to reduce the engine speed, thus bringing fuel efficiency improvements. Downspeeding allows the engine to operate at the most efficient speed while generating the power needed to maintain the desired cruising speed.

In its Confidence Report on Downspeeding,[2] NACFE found that fleets could see a 2–3% fuel economy improvement from downspeeding their engines. The study also found that, when optimally applied, downspeeding can help in areas such as noise reduction and improved drivability.

REAR DRIVE "TANDEM" AXLES, ONE OF WHICH IS NOT POWERED IN A 6 × 2 CONFIGURATION



FORWARD STEER AXLE – IDENTICAL IN BOTH A 6 × 4 AND A 6 × 2 CONFIGURATION

Chassis changes

Every truck maker NACFE spoke to for its Confidence Report[3] on 6x2 Axles agreed that this chassis configuration offers real fuel savings and remains a tool for achieving the Phase 2 targets of the greenhouse gas regulations. These regulations require truck builders to improve the fuel efficiency of the trucks they produce starting in 2014 through 2027. However, adoption by the line-haul industry is being hampered by perceived consequences of 6x2 axles such as higher tire wear.

Liftable pusher axles are the newest variation of 6x2s. For fleets with diminishing or variable loads where the full carrying capacity of a tandem axle is not always needed, the liftable tandem axle 6x2 configuration may be a more cost-effective solution. When operating in the down position, a liftable system performs like a conventional 6x2 system, with one drive (live) axle and one free-rolling (dead) axle, resulting in the same fuel-economy benefits (2.5%) as the non-liftable tag axle systems. When in the down position, automatic weight shifting sensors can be programed to distribute the weight equally on both axles or be biased to the drive axle. This is fully automated and requires no driver intervention.

Idle reduction options

Each year in the United States, sleeper tractors burn millions of gallons of diesel fuel while idling. A plethora of idle-reduction solutions has emerged, including battery HVAC systems, diesel-fueled heaters, engine start-stop, driver training and incentives to reduce idling and solar panels for tractors.

Reducing idle time saves fuel, improves a fleet's "green image" and is likely to save a small amount of wear and tear on the main engine. A 10% annual reduction in idling is worth 1% in fuel economy, which translates to about $500–700 annually if fuel is $3 a gallon and the truck travels 100,000 miles a year. A reduction of 20% in idling is not unreasonable if the right combination of technologies is employed and managed, according to NACFE's Confidence Report on Idle Reduction.[4] There is no one-size-fits-all solution to idle reduction. Instead, there are various options, some of which can be combined to reach an optimal solution.

The right tires at the right pressure

The entire weight of the tractor and trailer rides on the tires, generating rolling resistance, thus making tires an important area to consider for improving fuel efficiency.

Low rolling resistance (LRR) tires, whether in a dual or wide-base configuration, provide significant fuel savings when compared with tires that are not designed for low rolling resistance. If tire rolling resistance accounts for about one-quarter to one-third of truck fuel consumption, a 5% improvement in rolling resistance will produce a 1.3–1.7% improvement in fuel economy, according to NACFE's Confidence Report on Low Rolling Resistance Tires.[5]

The purchase price for LRR tires is higher than for non-LRR tires, but these costs are offset by fuel savings when considering total life-cycle costs.

While the tires can save fuel, the correct tire pressure is critical to the optimal operation of a commercial vehicle. Underinflated tires result in decreased fuel efficiency and increased tire wear. A 0.5–1.0% increase in fuel consumption is seen in vehicles running with tires underinflated by 10 psi, according to NACFE's Confidence Report on Tire Pressure Systems.[6]

Maintaining the correct tire pressure contributes to improved fuel efficiency, reduced tire wear and longer casing life. Tire pressure monitoring and inflation systems for tractors and trailers can alert the driver when tire pressure is below a preset level. Tire pressure monitoring systems track the pressure levels of tires using sensors and indicators.

Automatic tire inflation systems monitor tire inflation pressures and re-inflate the tires when the detected pressure is below the preset target. The system uses the vehicle's compressed-air tanks or a self-contained pump.

Other fuel saving options

There is growing interest in solar panels for helping with fuel management. The extra power available from solar panels can augment that coming from the engine alternator, thereby maintaining the batteries at a higher average state of charge and extending battery life. An appropriately sized solar panel can provide additional current and battery charging capacity to help manage refrigeration units, electric liftgates and telematics devices.

According to NACFE's Confidence Report on Solar for Trucks and Trailers,[7] solar technology for trucks has progressed to the point where the panels available are flexible, thin, easily installed and reliable. There are some excellent applications of this technology, for example, supporting the batteries for trailer telematics systems, and these should be strongly considered for future purchases. Operators should evaluate the costs and benefits of other applications of solar technology to determine if they are appropriate. Fuel saving is generally a very small part of the overall benefit from a solar panel installation.

While reducing downtime is the main pathway to payback from investments in maintenance, adding information about the increased fuel economy of well-maintained trucks can make it easier to convince fleet management of the benefits of investment in maintenance technologies, tools, bay space, technicians or software.

Lowering truck speed provides significant fuel savings owing to decreased aerodynamic drag and tire rolling resistance. Some fleets allow higher speeds for limited periods, such as for passing slower vehicles. Driver fuel economy bonus schemes often include time at cruise control speeds as a key determinant of the cost saving. In its technology overview on speed limiters,[10] NACFE found that, although there is a perceived loss of productivity associated with reduced travel speed, four major fleets reported no significant productivity loss on 98% of their freight shipments after limiting their trucks' speeds.

Real-world data from NACFE's Run on Less testing support this conclusion. In the 2017 test, the overall average speed was 54 mph over the three-week period and the seven participating fleets averaged 10.1 mpg against a national average of 6.0. In 2019, NACFE's Run on Less test focused on regional haul operations and supported the previous conclusions. The overall average speed during the three weeks of the 2019 test was 55 mph, and the 10 participating fleets averaged 8.3 mpg in regional haul operations.

Fuel saving practices augment technology

While fleets can invest in many technologies to help to reduce fuel consumption, they can also take actions that will augment those technologies.

One of those practices is "lightweighting". Fleets can save 2,000 lb. with limited investment in lightweighting and up to 4,000 lb. with aggressive investment. Lightweighting can take place in various areas of the tractor and trailer including the powertrain, axles, suspension, wheel ends, driveshaft, frame and fifth wheel. One conclusion of NACFE's Confidence Report on Lightweighting[8] was that fleets that tend to gross out (carry the maximum payload allowable) can gain economically from lightweighting as they can from hauling more goods. A pound removed from the equipment can be added in payload. Most operations do not gross out, but as freight becomes denser, driven by many factors, and as most of the efficiency technologies noted in this paper add weight, all fleets should consider the lightweighting measures that make sense for them.

While every truck needs to be maintained to ensure safe and reliable operation, optimizing maintenance can lead to fuel economy savings. NACFE's Confidence Report on Truck Maintenance[9] looked at 10 major components or systems and found that there is strong evidence that properly maintained trucks show improved fuel economy.

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[1]NACFE Confidence Report: Programmable Engine Parameters
https://nacfe.org/technology/electronic-engine-parameters/

[2]NACFE Confidence Report: Downspeeding
https://nacfe.org/technology/downspeeding/

[3]NACFE Confidence Report: Liftable 6x2Axles
https://nacfe.org/technology/liftable-6x2-axles/

[4]NACFE Confidence Report: Idle Reduction
https://nacfe.org/technology-guide/idle-reduction/

[5]NACFE Confidence Report: Low Rolling Resistance Tires
https://nacfe.org/technology/low-rolling-resistance-duals/

[6]NACFE Confidence Report: Tire Pressure Systems
https://nacfe.org/technology/tire-pressure-inflation-systems-trailers/

[7]NACFE Confidence Report: Solar For Trucks and Trailers
https://nacfe.org/technology/solar-panels/

[8]NACFE Confidence Report: Lightweighting
https://nacfe.org/technology/lightweighting-2/

[9]NACFE Confidence Report: Truck Maintenance
https://nacfe.org/technology/preventive-maintenance/

[10]NACFE Technology Overview: Speed Limiters
https://nacfe.org/technology/limiting-speed/