

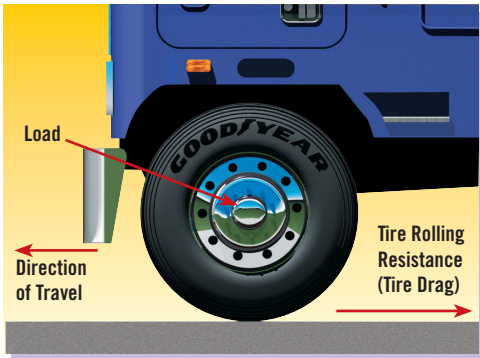


# FACTORS AFFECTING TRUCK FUEL ECONOMY

## Important Factors Affecting Truck Fuel Economy

As a vehicle travels down a road, there are a number of factors that contribute to the amount of fuel it will use in getting from Point A to Point B. Tires are just one of many factors.

As each tire on a vehicle rolls down the road, it creates a drag force. It is composed of the energy loss created by the deflection of the tire sidewall and the compression and deformation of the tire tread in the footprint at the road surface. This drag force is called rolling resistance and can be measured very accurately in a laboratory.

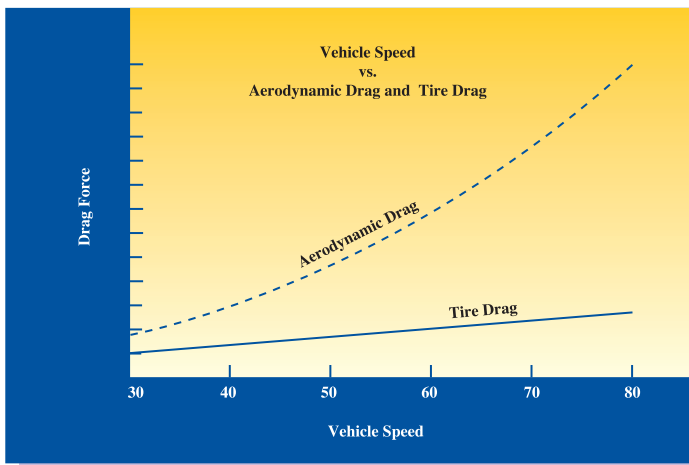


## Other Factors Contributing To Fuel Efficiency

The contribution of tires to the total energy required to move a vehicle down the road is dependent upon the effects of many outside factors, which include:

### Aerodynamics And Speed

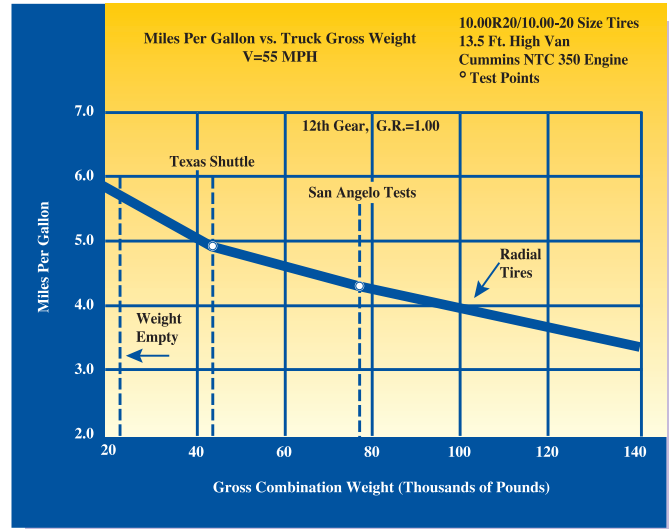
A vehicle's aerodynamics and its traveling speed have an extremely large effect on how much fuel is consumed. The force created by the aerodynamic drag of a vehicle goes up exponentially with the speed of the vehicle. Tire rolling resistance increases with speed, but tires are a proportionally smaller percentage of the total drag on a vehicle as the speed increases.



Source: Goodyear Computer Fuel Economy Model

## Load

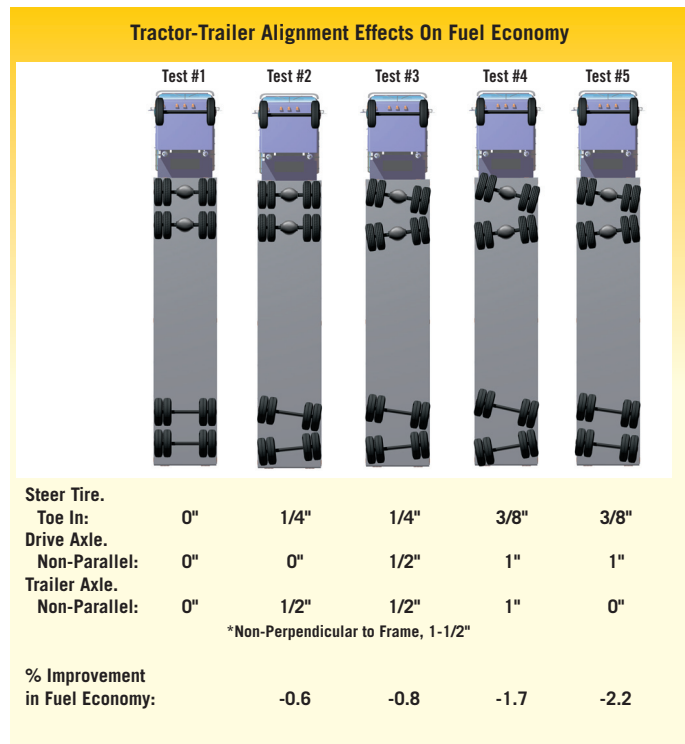
A heavily loaded truck will use more fuel than a lightly loaded truck. Think of the extra fuel you might use when taking the entire family (and luggage) on vacation compared to the fuel you might use in the same vehicle with you as the driver and no passengers. For a truck, a good rule-of-thumb is that for each 10,000 pound increase in load, fuel economy will drop 5%.



Source: Goodyear Testing Data

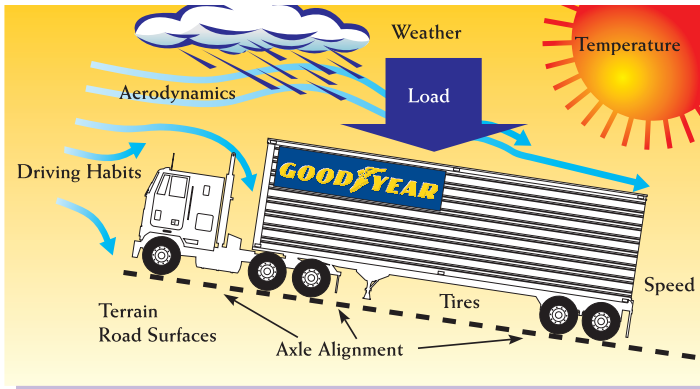
## Wheel Alignment And Inflation Pressure

If any of the wheels on an 18-wheel tractor and trailer are not properly aligned, the total drag on the vehicle increases. There is greater "scrub" of the tires against the road surface and, potentially, greater aerodynamic drag when the tractor and trailer are not tracking parallel to the direction of travel.



## Driving Style

The driving habits or “style” of the operator of a vehicle can have a very large influence on the amount of fuel consumed. Aggressive drivers can negate many of the gains obtained from investments in fuel-efficient tires and engines, aerodynamic devices or synthetic lubricants. With today’s technology, it is possible to accurately measure the amount of fuel an engine uses over a period of time so programs can be set up to reward drivers for fuel efficiency.

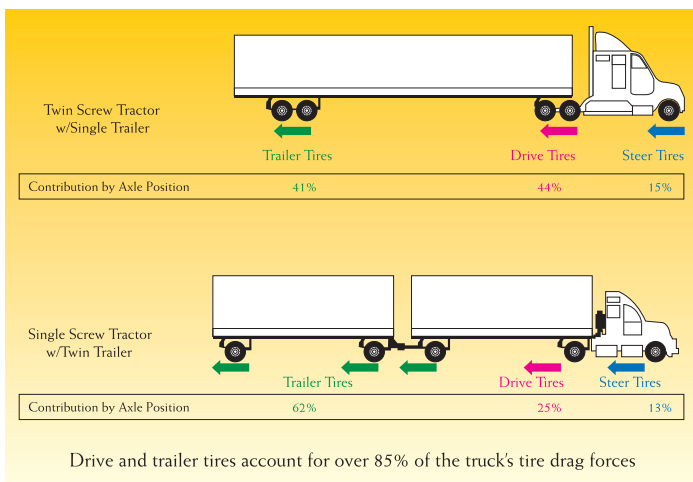


## Other Factors

Ambient air temperature, weather conditions, road surfaces (gravel, asphalt, concrete) and terrain (flat, hilly or mountainous) are “environmental” factors that are impossible to control, but have a direct effect on fuel consumption.

## Back To Tires

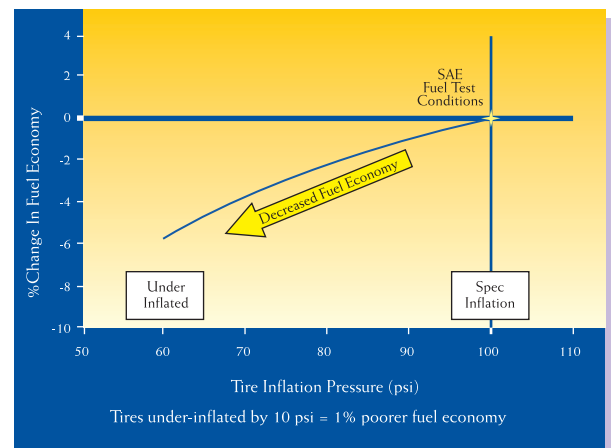
• Each of the wheel positions contributes a portion to the total tire rolling resistance. Since the drive and trailer tires account for over 85% of total rolling resistance, tire companies concentrate their fuel efficiency efforts on these axle positions.



• Most of the gains in fuel efficiency can be obtained from the tread of the tire, from the tread compound, tread design and/or the tread depth. Research shows that the tread contributes to over half of the rolling resistance.



- It is important to keep tires properly inflated so that the strength of the tire is not compromised. Fuel economy falls off sharply when tires are underinflated.
- If a rolling resistance improvement is made with the tread only, the improvement diminishes as the tread is worn down to 0 tread depth.
- If a rolling resistance improvement is made in the casing components of the tire, that improvement will remain throughout the tread life of the tire.



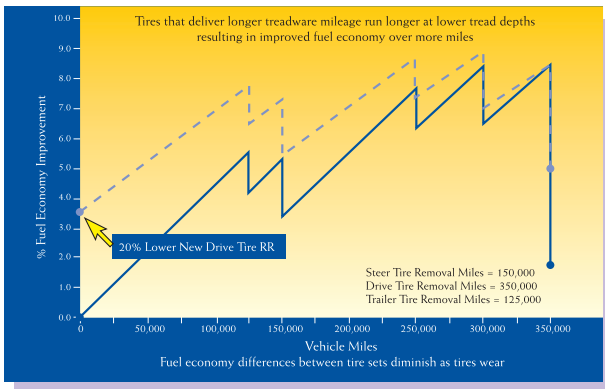
Source: Goodyear Computer Fuel Economy Model

## All Things Being Equal, The Following Statements May Be Made About Tires

- Shallow original tread tires have lower rolling resistance than deep original tread tires
- Rib tires have lower rolling resistance than lug tires
- Old tires have lower rolling resistance than brand new tires
- Worn tires have lower rolling resistance than brand new tires

Consider two tractor/trailers. One has “standard” drive axle tires and the other has “fuel-efficient” drive axle tires. Assume that the wear rates are equal for each type (standard and fuel-efficient), and for the steer, drive and trailer position tires.

Chart 9 illustrates the effect of tire wear on fuel economy improvement as each of the vehicle wheel position tires are worn out and replaced over 350,000 miles.

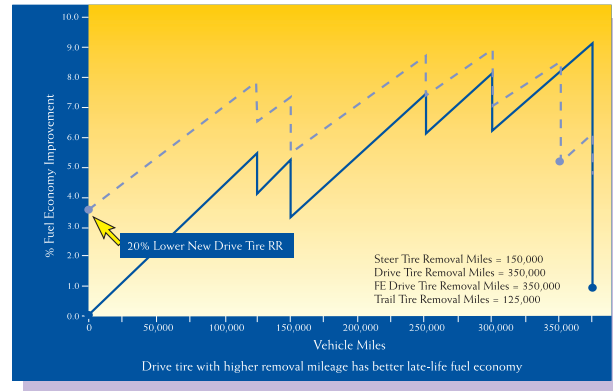


Source: Goodyear Computer Fuel Economy Model

Even though the fuel-efficient drive tires have 20% lower rolling resistance and can deliver a 3-1/2% improvement in fuel economy when all the tires are new (full tread depth), as the tires wear, the fuel economy improvement of the low rolling resistance tires diminishes when the drive tires need to be replaced. Each vehicle is getting the same miles per gallon when the tires need to be replaced.

In this case, the 3-1/2% advantage of the fuel-efficient drive tires decreases to 0% advantage when the tires are worn out. So, the overall average advantage is really only half of the 3-1/2% or 1-3/4%.

If the standard drive axle tires get better treadwear than fuel-efficient tires, there is actually a point where the truck with the standard tires gets better fuel economy than the truck with low rolling resistance tires.



Source: Goodyear Computer Fuel Economy Model

## What You Need To Know About Fuel Efficiency

The average fuel costs of a given trucking fleet are related to two factors:

- Average fleet miles per gallon
- Average fuel cost per gallon

There are steps that can be taken to increase average fleet miles per gallon. The miles per gallon achieved by a given truck depends on many factors, the major ones being:

- Vehicle, engine and accessory design and maintenance
- Driving style
- Tire selection and maintenance
- Environmental conditions

Fuel-efficient tires with a low rolling resistance are offered by all major tire companies. Although such tires can improve vehicle fuel efficiency, the gains will not be as much as demonstrated in standardized tests designed to eliminate or reduce the many other environmental factors that affect fuel usage.

The fuel economy advantage of low rolling resistance tires tends to diminish as the tires wear down since most of the gains come from changes made to the tread of the tire. So, the advantages gained when tires are at full tread depth will be cut in half over the life cycle of a tire's tread life.

Many Fleet Managers feel that the investment in low rolling resistance tires, which tend to cost more, is money well spent. Depending on the type of fleet operation, vehicles used, driver situation and the fluctuating cost of fuel, a Fleet Manager must analyze all factors affecting fuel efficiency to make an informed decision regarding fuel-efficient tires for his fleet.

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