Factors affecting truck fuel economy

Tyre rolling resistance

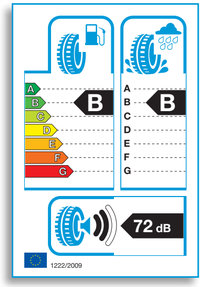
In addition to the recommended use of specific “fuel efficient” tyres, here are a few general comments concerning factors affecting tyre rolling resistance:

- Rib type tyres are better with regard to rolling resistance than block type tyres, this is mainly due to less movement of the tread in the contact patch area.
- Low aspect ratio tyres are stiffer, allowing for less flexing under load, thus they typically have lower rolling resistance compared to high aspect ratio tyres.
- Worn tyres have less rolling resistance than new tyres - as a truck tyre wears down, the tread pattern stiffens, which leads to less flexing/deformation in the tread area.

The use of fuel efficient tyres on all axle positions can make a significant difference in fuel consumption, a reduction of 10% of rolling resistance on a complete vehicle results in approximately 3% reduced fuel consumption (approx 0.9 litres/100 km on a vehicle which consumes 30 litres/100 km).

Truck Tyre Label

The importance of rolling resistance to a vehicle’s fuel economy is shown by the EU Tyre Label. From November 1, 2012 labelling information must be supplied with most heavy truck tyres sold in the European Union. This information is to help buyers make a more informed decision when purchasing tyres. The label covers ratings for fuel efficiency (rolling resistance), wet grip and exterior noise.



FUEL EFFICIENCY / ROLLING RESISTANCE
A = Most fuel efficient tyre
F = Least fuel efficient tyre
(Class G will not be used for truck tyres)

A high grading in fuel efficiency represents less rolling resistance and directly impacts on fuel consumption and the environment. With lower rolling resistance a tyre requires less energy so less fuel is used and, in turn less CO_2 is emitted. A win-win situation.

Effects may vary according to the vehicle and driving conditions. However, the difference between a complete set of new A-class and F-class tyres could reduce a truck’s fuel consumption by up to 15%, which is equivalent to an annual saving of more than €7000*.

* Calculations based on tests made by the Goodyear Innovation Centre Luxembourg 2012 and on the following assumption: Average fuel consumption of vehicle 32.3l/100km → 323l/1000km → 14.7% potential savings = 47.5l less fuel consumption per 1000 km → fuel price 1.50 EUR/litre = 71.25 EUR/1000km → 100,000 km mileage/year = 7,125 EUR savings/year.

Summary

Using low rolling resistance, fuel efficient tyres in place of standard tyres, in combination with good vehicle and tyre maintenance and an economic driving style, minimises fuel consumption.

With today’s fluctuating fuel prices, as well as more and more restrictive emission legislations, fuel consumption is a major economical and ecological factor in transport operations.

Goodyear’s modern, fuel efficient truck and bus tyres provide an ideal option to:

- maximise fleet efficiency
- minimise cost/km
- reduce CO_2 emissions

Easy tip: evaluate the potential fuel and CO_2 impact with the Fuel Efficiency Calculator on **www.fleet-calculator.eu**

www.goodyear.eu/truck

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Goodyear Fuel Economy

Factors affecting truck fuel economy

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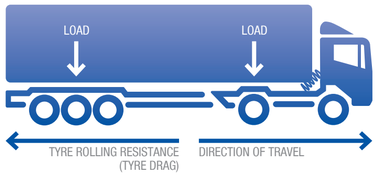
General considerations

There are a number of factors that contribute to the amount of fuel a vehicle uses.

The main parameters are vehicle weight, aerodynamic drag, mechanical losses, driving style and rolling resistance. Although tyres are just one of these factors, they can affect up to 1/3 of the vehicle's total fuel consumption.

Each tyre creates drag. This is caused to a great extent by energy loss due to the deformation in the tyre as it travels over the road.

This drag is called rolling resistance.



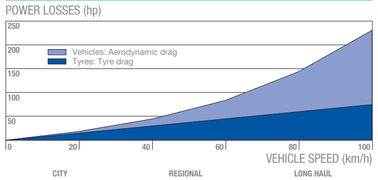
The contribution of tyres to the total energy required to move a vehicle down the road is dependent upon the effects of many outside factors, which include:

Aerodynamics and speed

A vehicle's aerodynamics and its travelling 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.

Tyre rolling resistance increases linearly with speed, but tyres are a proportionally smaller percentage of the total drag on a vehicle as the speed increases.



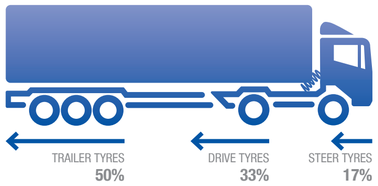
Other factors

Ambient air temperature, weather conditions, road surfaces (sand, 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.

Vehicle configuration

On a typical 40 ton, 5 axle truck, each axle contributes to a portion of the total vehicle tyre rolling resistance.

Drive and trailer axles combined contribute about 83% of the total tyre rolling resistance. To minimise the vehicle's fuel consumption, it is recommended to equip all axles with low rolling resistance, fuel efficient tyres.

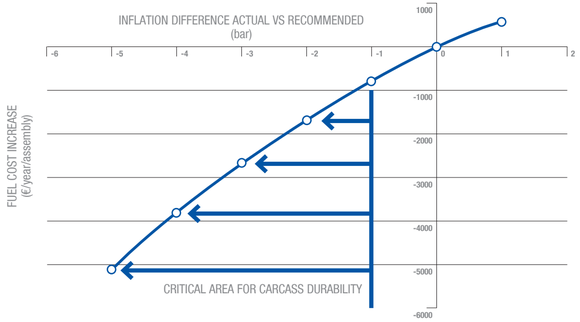


Tyre inflation

Tyre rolling resistance is heavily dependent on inflation pressure. A 1 bar deviation from the nominal inflation pressure could lead to a 5% difference in rolling resistance, which may result in a significant fuel cost increase (see example below).

For optimum rolling resistance, it's important to have the tyres inflated correctly, as recommended for the respective axle loads. In addition, underinflation may have negative effects on tyre durability and can cause failure.

Fuel difference per truck based on:
150,000 km/year – 1€/L – 35L/100 km.



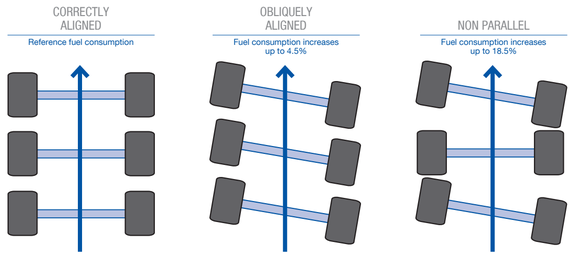
1 bar underinflation in every tyre can cost €900 of fuel per year and the carcass can be lost for retreading.

Wheel alignment

Incorrect axle alignment drastically influences rolling resistance, increasing fuel consumption and causing accelerated tyre wear.

If any axles on a truck are not properly aligned, drag increases and the tyres wear out much faster. This means more fuel used and accelerated tyre wear.

This example of a 3 axle trailer shows that correct vehicle alignment helps to optimise fuel economy.



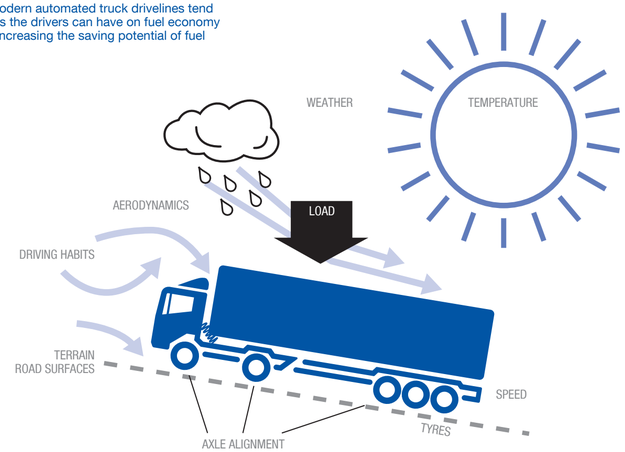
Driving style

The driving habits or style of the driver of a vehicle can have a very large influence on the amount of fuel consumed.

Aggressive driving can wipe out many of the gains obtained from investments in fuel-efficient tyres and engines, aerodynamic devices or synthetic lubricants.

However, today's modern automated truck drivelines tend to reduce differences the drivers can have on fuel economy driving thus further increasing the saving potential of fuel efficient tyres.

With today's technology, it is possible to accurately measure the amount of fuel a vehicle uses over a period of time allowing for programs to be set up to reward drivers for good fuel efficiency.



Fuel efficient truck tyres

Most of the gains in fuel efficiency can be obtained from the crown area of the tyre (tread compound, tread design and/or the tread depth, belt package). The crown area contributes about 75% of the tyre's rolling resistance, with the sidewall and bead areas contributing about 25%.

That's also why using the optimum inflation pressure is very important: it makes the tread area deform just enough to carry the load, and avoids unnecessary tread movement generating heat, consequently increasing rolling resistance.