

## Health and Science Series

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Number 6 August 24, 2004

### HORSEPOWER EFFECTS

### ON OUR DAILY COMMUTE

All of us who drive combustion engine vehicles have shared experiences where we have relied on (and sometimes wished for more) **horsepower** to quickly and safely pass another vehicle on a two-lane road. We have also depended on horsepower to haul heavy loads up hills and pull trailers or boats without straining our engines.

Our interest in and appreciation for horsepower also extends to sports and racing cars. Many of us, however, are not aware of the relationship between the lack of **adequate horsepower** and **traffic congestion affecting our lives daily**. The U.S. Department of Transportation, Federal Highway Administration estimates that the **Nation lost 3,599,000,000 vehicle hours** and **\$67 billion** in traffic congestion **costs** for the year 2,000. (1).

“**Horsepower**” represents an engine’s **rate of work**. It is calculated using factors of **force, time and distance**. One horsepower represents the amount of power it takes to lift 550 pounds one foot in one second. Chemical energy (fuel) is converted to mechanical energy, and the quantity of **power** produced by an engine is proportional to the **rate** at which **fuel** is burned. (2).

Engines convert fuel into “**torque**”, which is the twisting force imparted to the crank and then transmitted to the transmission and drivetrain. Torque is measured in pounds-feet, with one pound-foot equal to the twisting force produced when a one-pound force is applied to the end of a lever one foot long. **Torque** is the force that **starts** a vehicle moving and **horsepower** is the force that **maintains** movement.

The Federal Highway Administration rates the “**quality**” of **traffic flow** according to “**Level of Service (LOS)**” **categories**. LOS A is uninterrupted flow where the movements of any given vehicle do not adversely affect the travel of other vehicles. LOS F indicates **unstable stop and go movement caused by the presence of trucks**.

Large trucks in the traffic stream not only negatively impact flow quality because of their size, **acceleration** and braking but increase the incidence and severity of crashes. Trucks have less **acceleration** capacity than cars with lower **weight- to- horsepower ratios**. As the proportion of trucks in the traffic stream increases, traffic flow slows and accidents increase.

**Acceleration** is a function of **horsepower**. **Acceleration** determines **performance**, which often is rated in time from standstill to 60 miles per hour. More meaningful performance is midrange acceleration, going from 30 mph to 50 mph or 50 mph to 65 mph. It is often necessary to reach these speeds quickly in order to merge or pass safely.

On level roads without congestion, a conventional truck is equivalent to approximately two cars. On hill and mountain roads with congestion, the same truck may be equivalent to **15 or more autos**.

A truck's capacity to blend well with other vehicles in traffic is determined by its **acceleration performance**. Poor acceleration or speed maintenance results in large speed differentials among vehicles in traffic, significantly increasing **crash risks**. At a speed differential of 20 miles per hour crash incidence may be **15 times** more likely than when there is no difference in speeds.

Although engine manufacturers are building engines with more horsepower for trucks, most trucks on the road do not meet the Federal policy guidelines and are still under-powered. These large vehicles sorely need the **10% to 15%** boost in horsepower that the **Fuel Fx Reactors** have been shown in many tests to provide through **more efficient fuel combustion**. This is a **great benefit** along with the Reactors' **increasing fuel efficiency, lowering emissions, and decreasing undesirable mechanical vibration and noise**.

Many passenger cars and SUV's are also in need of more horsepower. (3). Who among us would not welcome the knowledge that his or her vehicle had an additional 10% to 15% **horsepower reserve** to draw upon in **critical or emergency situations**?

## REFERENCES

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3. Flammang, J.M./auto Media.com: How much engine do you really need?