

Reprinted from *Real Answers*

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Does speed kill?

Volume 13, Issue 3

real QUESTIONS  
real ANSWERS

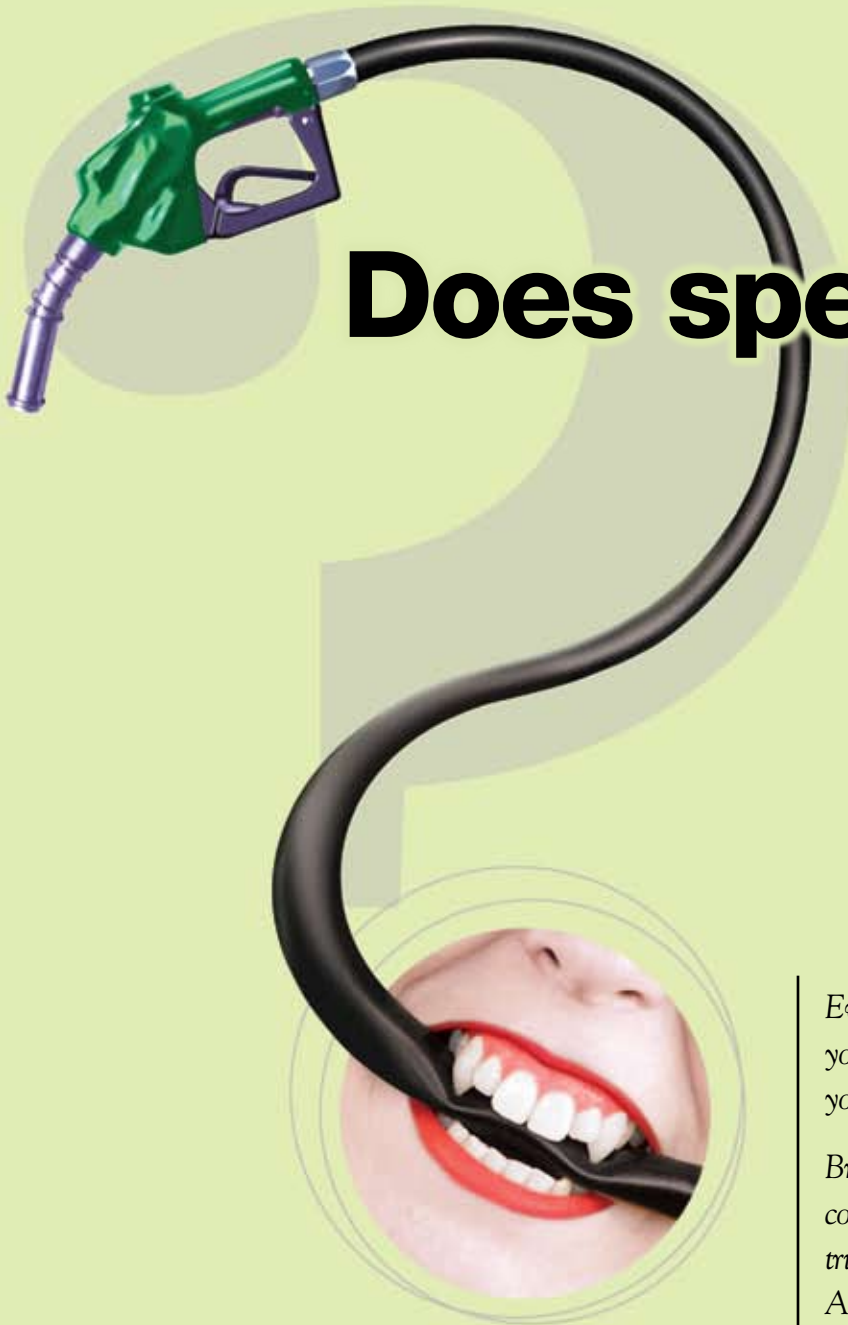
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Editor's Note: Today's trucks have an estimated engine and drive train efficiency of approximately 40 percent. Therefore, only about 40 percent of the energy converted from diesel fuel reaches the axles. Some things influence use of this 40 percent of available energy more than others. In this article, we focus on one of the most important influences, speed.



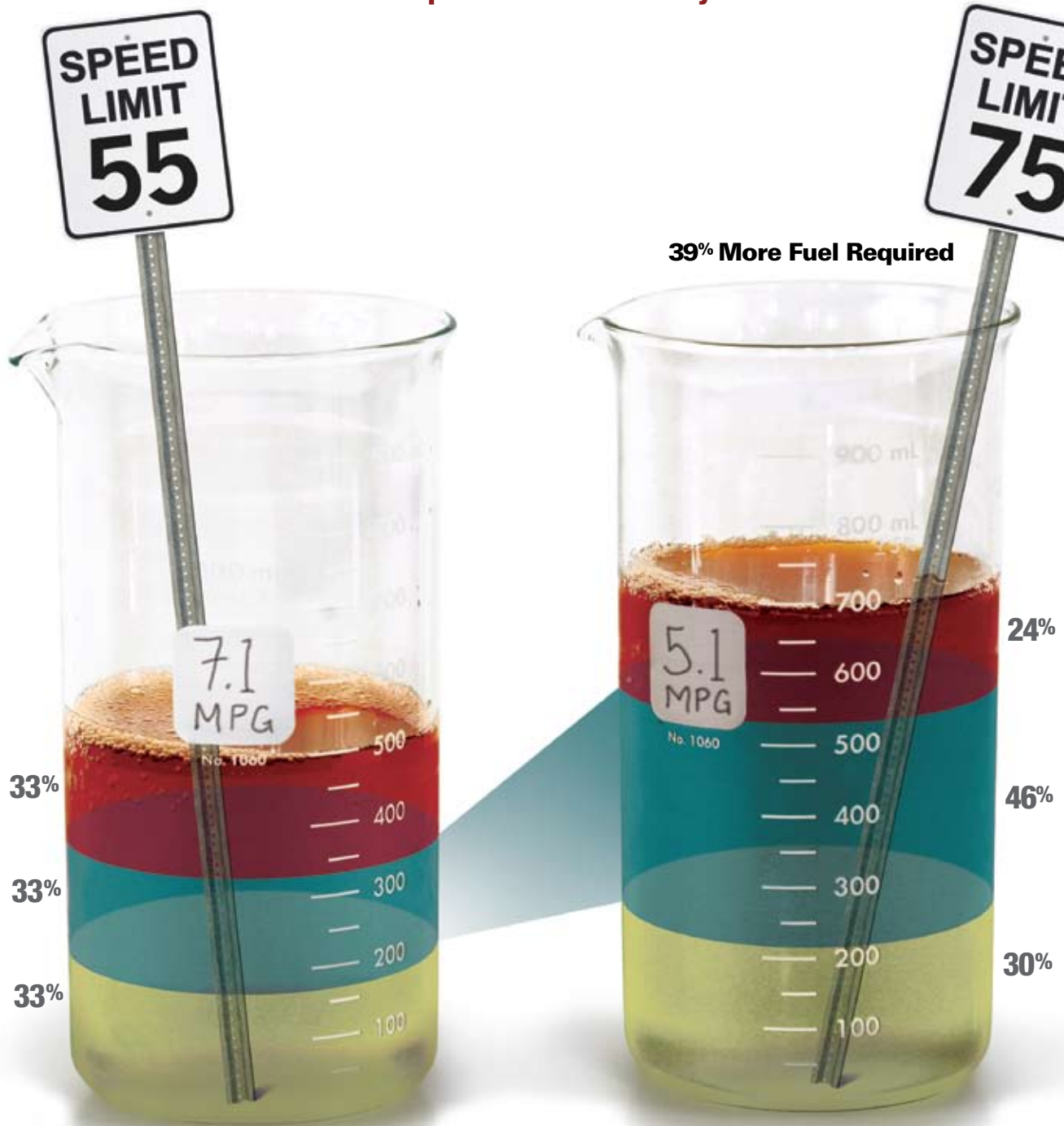
# Does speed kill

*Everybody knows that when you slow down, you save fuel. How big are the savings when you reduce your speed?*

*Bridgestone recently released its fourth comprehensive fuel economy guide for large trucks. "Tires & Truck Fuel Economy – A New Perspective" looks at what we've learned over a quarter-century of studying the relationship of tires to large truck fuel economy.*

*In the next few issues, we'll take an in-depth look at some of the biggest factors affecting fuel economy, starting with speed.*

## Effect of Speed on Fuel Efficiency Factors



● TIRE ROLLING RESISTANCE    ● AIR RESISTANCE    ● EVERYTHING ELSE

Increasing speed from 55 to 75 mph can increase fuel consumption by 39 percent, while cutting the effectiveness of fuel-efficient tires by 27 percent.

[Since engine and drivetrain efficiency is approximately 40%, only about 40% of fuel consumed actually moves the vehicle. That portion would be divided approximately as shown above.]

**Why does speed affect fuel economy so much?**

The truck’s engine and drive train require energy, or fuel, to push against two things: the air and the drag of the tires.

When your truck is moving slowly, below 45 mph, air resistance is practically nonexistent. Very little fuel is required to “fight” the wind.

Above 45 mph is another matter entirely.

At 75 mph, air resistance is the biggest contributor to fuel consumption. The faster you drive, the more fuel must be used to push your truck forward.

**How much more?**

You’ll need 39 percent more fuel to drive at 75 mph than you’d use at 55 mph. Of the fuel your truck consumes maintaining this higher speed, 46 percent is used to fight air resistance. That’s almost half the fuel! Take a look at the illustration using the beakers on the previous page. At 55 mph, air resistance drops to 33 percent.

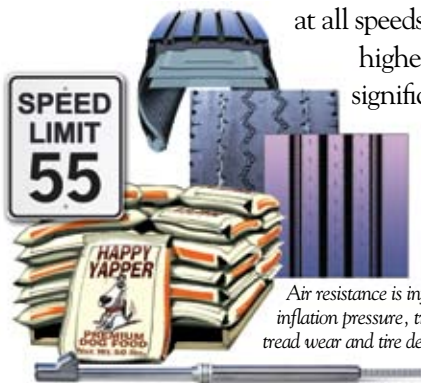
**How does a tire’s rolling resistance affect fuel economy?**

Rolling resistance is drag. It takes more energy to flex and un-flex as the tire rolls down the highway. It’s even harder when the tire is fully loaded.

Let’s go back to the beaker illustration. Of the fuel your truck burned at 75 mph, 24 percent is used to combat tire rolling resistance.

At 55 mph, air resistance and tire rolling resistance are the same – that’s because rolling resistance is present

at all speeds. It does increase at higher speeds, but not as significantly as air resistance.



Yet cutting rolling resistance doesn’t produce an equal improvement in fuel economy.

**Why aren’t the two the same?**

Because rolling resistance isn’t the only factor involved in this equation. At higher speeds, the fuel consumed to fight rolling resistance remains about the same because the air resistance’s influence rises, ultimately becoming the biggest factor.

In most cases, it takes about a three- or four-percent change in a tire’s rolling resistance to produce a one-percent change in fuel economy.

**What is the rolling resistance of tires certified by SmartWay<sup>SM</sup>?**

SmartWay is an innovative partnership of the U.S. Environmental Protection Agency (EPA) that reduces greenhouse gases and other air pollutants and improves fuel efficiency. The Bridgestone private fleet is a SmartWay Transport Partner.

Tires that earn EPA SmartWay certification must achieve at least three percent better fuel economy than the average new tire. So, based on what we’ve learned, these qualified tires achieve about nine percent better rolling resistance than the average new tire.

**We know driving 55 mph uses less fuel. How much less?**

A group of Bridgestone test vehicles driven at 55 mph achieved a fuel-sipping 7.1 miles per gallon rating. At 75 mph, those numbers sank to 5.1 miles per gallon.

**Fuel Economy at Different Speeds**



Some measured changes in miles per gallon at different speeds.

**But 55 mph is too slow. Are there payoffs to driving a bit faster?**

You may find 65 mph is more practical. At this speed, test vehicles turned in a respectable 6.0 miles per gallon rating.

**The EPA certified six Bridgestone tires for fleets operating SmartWay-eligible tractor-trailers: R287 steer, R280 steer, M720 drive, R195F trailer, Greatec drive and Greatec trailer radials. If you would like to learn how EPA SmartWay can help your fleet save fuel, visit [www.epa.gov/smartway](http://www.epa.gov/smartway).**



Compared to 75 mph, driving 65 mph saved 15 percent more fuel and increased miles per gallon by 18 percent.

### Fuel Economy & Travel Time at Different Speeds

| SPEED | MILES PER GALLON | INCREASE IN MILES PER GALLON | PERCENT FUEL SAVED | TIME FOR 500 MILES OF TRAVEL | INCREASE IN TRAVEL TIME |
|-------|------------------|------------------------------|--------------------|------------------------------|-------------------------|
| 75    | 5.1              | —                            | —                  | 6 hr. 40 min.                | —                       |
| 65    | 6.0              | 18%                          | 15%                | 7 hr. 42 min.                | 15.5%                   |
| 55    | 7.1              | 39%                          | 28.2%              | 9 hr. 5 min.                 | 36.2%                   |

Dropping your speed to 55 mph saves considerable fuel, but at the expense of time. And chances are, your fleet doesn't have that kind of luxury. Maintaining a 65 mph speed increases travel times just 15 percent – which you may find more feasible.

Still, some fleets are finding it pays to take it slow. If you can still meet your delivery schedule and your drivers have plenty of hours of service to make the run, cutting speed to 55 mph can be an effective way to save fuel.

And, driving 55 mph maximizes your tires' fuel efficiency.

#### How so?

Fuel economy decreases when speed increases – and that includes tires. But if you're running fuel-efficient tires, more of their fuel-efficient characteristics may be lost – some 45 percent at 75 mph. The fuel economy loss for a non-fuel-efficient tire is only about 30 percent when driven at the same rate of speed.

Take a look at the chart below. At 55 mph, the fuel-efficient tire is getting as much as 11.8 percent greater fuel economy than the non-fuel-efficient tire.

Increase the speed to 75 mph, and the difference between the two types of tires shrinks to 8.6 percent.

At higher speeds, fuel-efficient tires suffer more.


#### What about tire life?

It's no question – tires wear faster. Driving at high speeds can cut removal mileage by as much as 10 to 30 percent – a rather significant amount.

And that's not all. Faster speeds can change the footprint shape, which can cause uneven wear. And with tires running hotter, casing life and retreadability could also be affected.

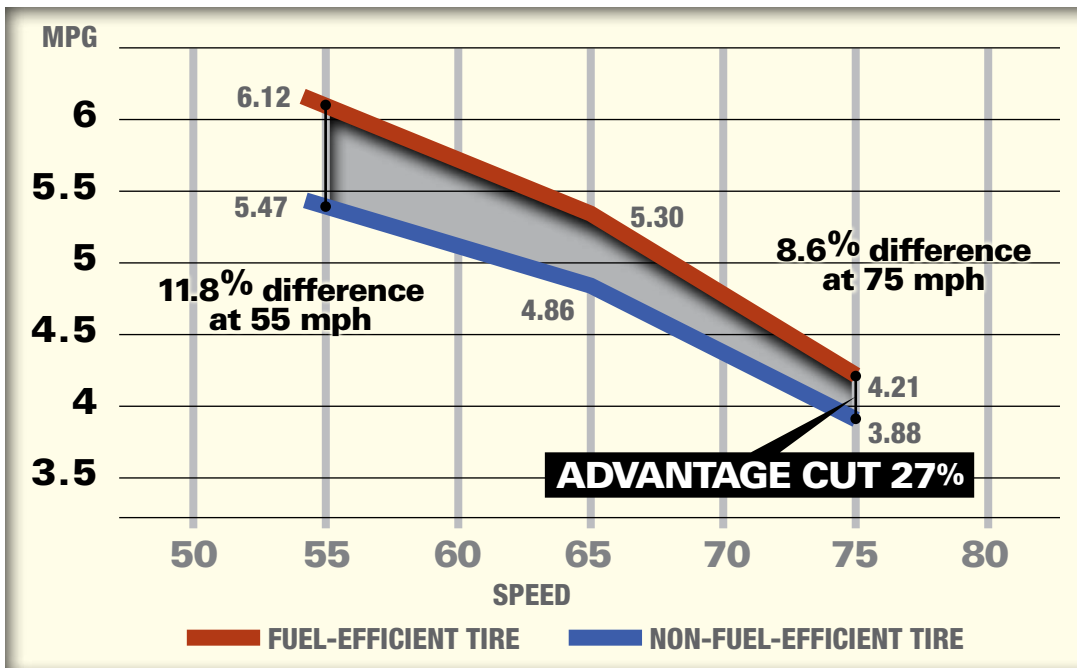
So, if you're still wondering how much this will save you, you may want to slow down and calculate how much it's costing.

*Editor's note:*

A special Bridgestone video, "What Drivers Can Do to Save Fuel," offers real-world tips on boosting fuel economy to your drivers. To order your video, call 1-888-694-0469 or e-mail [realanswers@trucktires.com](mailto:realanswers@trucktires.com). Specify VHS or DVD format. If you didn't receive the last edition of *Real Answers Magazine, Tires & Truck Fuel Economy - A New Perspective* – or simply want another copy to pass along to a colleague, call 1-888-694-0469 or e-mail [realanswers@trucktires.com](mailto:realanswers@trucktires.com). 

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### Effect of Speed on Tire Fuel Efficiency



Even if there is a significant difference between the fuel efficiency of tires at 55 mph, when speed is increased to 75 mph, 27 percent of the fuel economy advantage may be lost.

