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Configuration Effects

Special Edition Four

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BRIDGESTONE

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Configuration Effects

Fuel efficiency contributions by axle position

Bridgestone research indicates the contribution to overall vehicle fuel efficiency by tires is approximately equal to the proportion of vehicle weight on them.

Axle weights vary with different equipment and configurations, but a typical three-axle tractor and tandem axle trailer usually has about 12,000 lb on the steer axle and 34,000 lb on the drive and trailer tandems.

With a combination vehicle consisting of a two-axle tractor and 28-foot “pups,” about 11,000 lb of the load is on the steer axle; roughly 18,000 on the single drive axle and about 17,000 each on the dolly and trailer axles.

Bridgestone tests used both single trailers – with tandem drive axle tractors, as well as double trailers – with single drive axle tractors.

Single trailers

With tandem drive tractors pulling single trailers, tests showed about 43 percent of tire fuel economy was attributable to trailer tires, and about 57 percent to tractor tires.

Weight distribution predicts trailer tires should contribute 42 percent of the fuel economy effect, drive tires 42 percent, and steer tires 16 percent. That’s very close to the 43 percent, 39 percent and 18 percent actually found.

Another way of looking at it is that in this configuration, 44 percent of the tires are trailer tires and they contribute about 43 percent to tire fuel economy.

Tractor and trailer configuration affects both the contribution of tire rolling resistance to fuel economy and the distribution of fuel economy effects at the various axle positions.

And, for each 3-percent change in rolling resistance, fuel economy changed by about one percent.

“Pups”

When a tractor with a single drive axle was pulling two pups, the trailer tires accounted for 64 percent of the fuel economy effect, with the tractor tires contributing 36 percent.

Again, axle weight distribution predicted very similar results. With pups, it took about a 4-percent change in tire rolling resistance to produce a one percent change in overall fuel economy.

Or, with this configuration, trailer and dolly tires are 67 percent of the tires and contribute 64 percent to tire fuel economy.

Part of the reason for this is that with pups, there are two trailer air gaps, and therefore, air resistance has a bigger effect on fuel economy than it does with a single trailer.

Drive axle effects

In all the configurations tested, the contribution of drive tires to tire fuel economy was a bit less than predicted by weight distribution.

Bridgestone engineers believe the dynamics of drive axles are different from those of essentially free-rolling axles, like steer and trailer axles, and this may account for part of the discrepancy. **FA**

Axle Weight Distribution & Position Contribution to Fuel Economy

