Summary Statement

This report explores the pros and cons of fleet adoption of 6 X 2 tractors. These vehicles are equipped with a rear tandem axle that includes one drive axle and one non-driving axle. This tandem configuration is sometimes referred to as a tag tandem (non drive axle in the rearmost position) or pusher tandem (non-driving axle in the forward position of the tandem). Another term used is "dead axle tandem", to reflect the presence of one non-driving axle. Although 6 X 2 tractors have been available for years, their volumes have been relatively low. Recently, however, there is increasing interest in this configuration due to potential fuel economy increases ranging from 2.5 to as much as 6%.

Fleets evaluating this technology are showing immediate fuel cost savings. This technology is readily available today in most; if not all tractor OEM's data books and actually lowers the purchase price, weight and complexity of the tractor.

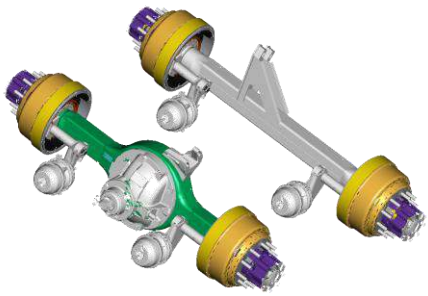
Drive Cycle Applicability or Industry Segment Applicability

Data used to create this report was obtained from two major long haul fleets based in North America and operating in the 48 contiguous states in all seasons and weather conditions. Not all fleets may find this technology appropriate, especially if there is a higher percentage of off-road or inclement weather driving involved (i.e.… vocational or heavy duty applications utilized in the construction industry where four wheel drive capability is often needed).

Technical Summary

- A typical three axle Class 8 tractor today is equipped with two rear drive axles ("live" tandem) and is commonly referred to as a 6 X 4 configuration meaning that it has four-wheel drive capability. See picture below.

"Live Tandem" – Two Driving Axles



"Tag Tandem" – One Driving Axle

- The 6 X 2 tractors configurations also have three axles; however, one of the two rear axles is a non-driving or "dead" axle. The non-driving axle has no internal gearing to provide drive to the wheels of the axle. As a result, there is no internal friction or losses due to lubricant churning, which reduces parasitic losses in the drivetrain.

- The non-driving axle still carries the same load weight rating as a normal second driving axle thus the load weight rating of the tandem (gross axle weight rating or GAWR) and tractor (gross vehicle weight rating or GVWR) does not change. Some OEM's utilize standard drive axle housing, but without a carrier assembly (the center section of the axle that houses the drive gearing) while others utilize a square tube axle with a uniform cross section, which further reduces the tractor weight.

- A 6 X 2 configuration is typically between 300lbs. and 400lbs. lighter than a 6 X 4 configuration.

- The 6 X 2 tractor configurations are readily available today at most, if not all U.S. Tractor OEM's.

- When specifying a vehicle to utilize a 6x2 configuration rather than a 6x4, the following components should be reviewed for modification. For instance, trailer tires are used in lieu of drive tires on the dead axle. Vehicle manufacturers may have other recommendations, based on duty cycle applicability.

    - Engine, Transmission, Rear Axle, Drive Axle Ratio, Clutch, Tow Hooks and Tire configurations.

Economics

- The purchase price of a 6 X 2 tractor compared with a 6 X 4 tractor is typically a few hundred dollars less. This may vary by vehicle manufacturer and by other components the purchaser or OEM may specify.

- Since there is typically no up charge for a 6 X 2 configuration, the fuel savings are immediate from day one of implementation.

- Vehicle resale value may be affected negatively depending on the industry adoption rate of this technology, due to perceived (and real) traction issues with the 6 X 2 vehicle in certain situations.

Real World Application

- At least two major fleets, focused in the long-haul full truckload arena, have adopted 6 X 2 tractors in their primary power specification drive train.

- Loss of traction while operating in wintry conditions and over uneven surfaces is the largest negative of adopting this technology. Fleets that operate a significant percentage of time in off-highway situations and/or inclement weather should consider this challenge before specifying a 6 X 2 configuration.

- Some fleets have chosen to specify tow hooks as an option when ordering a tractor. This option makes it handy for the few times that a truck does need to be pulled a few feet to regain traction. This is considered a wise investment to discourage operators from attaching a tow strap or chain to the bumper or suspension parts, which could cause damage.

- At least one fleet is experimenting with automatic chains, similar to those outfitted on fire trucks, ambulances and other emergency service vehicles to assist the driver when chains may be needed for a short distance on parking lots and other uneven surfaces.

- Gaining driver acceptance of this technology is difficult without proper training. This technology results in somewhat reduced traction. Unless properly trained, drivers will find themselves stuck in situations that would not normally immobilize a 6 X 4 tractor.

- It is possible to retrofit a 6 X 2 tractor back to a twin drive configuration; however, estimates from industry OEM's do not show this to be an economically feasible alternative, costing upwards of $10,000 to $20,000.

- Tire wear on the drive axle will increase although this is typically offset by the increased mileage achieved on the non-driving axle tires. Depending on whether or not the fleet utilizes virgin or retreaded trailer tread on the non-driving axle, an overall reduction in tire costs can be realized.

- Some in the industry relate a 6 X 2 configuration to being no different than the comparison of a 2-wheel drive and a 4-wheel drive pickup truck.

Government / Regulatory issues

There are no known obstacles in the U.S. Federal operating territories or states that would prohibit adoption/use of this technology.

Want more information?

The North American Council for Freight Efficiency is a Non-profit organization dedicated to doubling the freight efficiency of North American goods movement. We pursue this goal in two ways: Improving the quality and reliability of Information and Highlighting the success of high efficiency technologies. This Executive Report is the highest level of study that the Council creates in delivering to this mission. This information is directional in nature and limited in scope to an analysis of two US fleet operators. Performance results and costs will vary depending on specifications, duty cycle, geography and other criteria. The information contained in this report and the underlying data supportive of the report are intended for the benefit of NACFE members and their fleets. Contact the Council at contact@nacfe.org for more information or simply to comment on this report.