Inspection Bulletin

North American Standard Inspection Program

2015-05 – Advanced 6 x 2 Tractor Inspections

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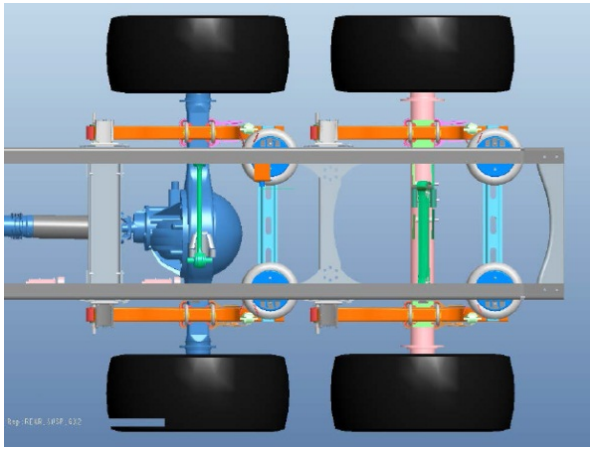
Summary

This Inspection Bulletin provides information on the operation of advanced 6 x 2 tractors as well as addressing issues that may arise while conducting roadside inspections on these vehicles.

Background

The typical three-axle tractor is considered a 6 x 4 system (Figure 1). This means that there are six wheel ends with four of those wheel ends potentially supplying power to the ground, meaning you have two drive axles. An advanced 6 x 2 system (Figure 2) has the same six wheel ends but will only have two that supply power to the ground, meaning there will be only one drive axle. The other axle is considered a non-drive axle and will either have a normal axle with all driveline components (i.e., driveshaft, gears within the differential) removed or it will be a solid axle with no differential housing. In either case, this axle will not provide any traction assistance propelling the vehicle. The non-drive axle can be in either axle location but is typically in the rearmost position.

6 x 4 Driveline System
(Figure 1)



6 x 2 Driveline System
(Figure 2)

Tractors equipped with a 6 x 2 axle configuration have been around for many years but have not been popular among the majority of carriers and/or fleets. Axle load distribution in the older systems was either fixed or manually adjustable. The manually adjustable systems could accommodate a loss of traction event by raising the non-drive axle but the fixed systems usually resulted in traction issues. Technology advances in suspension control have resulted in systems that automatically transfer load onto the drive axle during a low traction event. Availability of these automated systems has increased industry interest in using this 6 x 2 axle configuration. The advanced 6 x 2 system typically reduces tractor weight by 300-400 pounds (136-181 kilograms) and increases efficiency and fuel economy by 2-6 percent.

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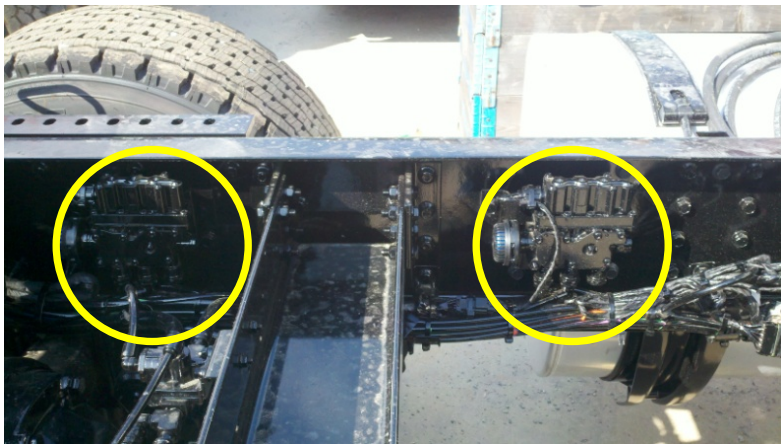
With previous traction concerns now addressed, the use of these systems is expected to become more popular as industry searches for ways to reduce costs and improve efficiency.

The advanced 6 x 2 systems are available from most OEM tractor manufacturers and will operate one of two ways:

- The first method is capable of transferring load from the non-drive axle to the drive axle during a traction control event. At all other times, the load is equally shared by the drive and non-drive axle. The system is powered by the tractor's ABS/ATC system and has actuator valves located inside the frame rail of the tractor that control drive and non-drive axle air bag pressures. When a traction control event occurs, the system will automatically increase drive axle air bag pressure and reduce pressure in the non-drive axle air bag, thereby increasing the drive axle load and traction capability while maintaining proper vehicle ride height. This temporary load transfer will only last for a brief period of time. Shortly after the traction control event ends, the system will automatically return to a load evenly distributed between both axles.

- The second method of operation, which will primarily be found on Volvo and Mack tractors, is a biased load transfer system. This system automatically adjusts the load between the two axles to permanently optimize traction. This load transfer occurs and remains during normal driving and is not limited to just when a traction control event occurs like the system described above. This system also includes actuator valves located inside the frame rail of the tractor for controlling air pressure to the drive and non-drive axle air bags (Figure 3). In an unladen situation, the system will put most of the load on the drive axle. As more load is placed on the rear axle of the tandem, the actuator valves will distribute more air pressure to the air bags of the non-drive axle. When the tractor is fully loaded, both axles will carry approximately the same load. This system also has the ability to further increase air pressure to the drive axle and reduce pressure in the non-drive axle air bags during a traction control event. **In cases where these vehicles are being operated unladen, the non-drive axle might appear to have deflated air bags when inspected as there will likely only be 3-5 PSI of pressure in the air bags.**



Actuator Valves (Figure 3)

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Both of the advanced 6 x 2 systems described in this bulletin are designed to ensure that when the tractor is in a load transfer or load biased mode, the maximum load on any axle does not exceed the manufacturer's axle rating or the single axle load limit imposed by the states or provinces.

Guidance

The advanced 6 x 2 system that is activated solely on a traction control event does not require any special considerations during a roadside inspection. Typically, the weight will be equally distributed on both axles on the tractor since a loss of traction will not be taking place at the time of the inspection.

The advanced 6 x 2 system found on Volvo and Mack tractors will require inspectors to be familiar with how the system works. If the tractor is unladen or lightly loaded, the drive axle may be carrying most of the load while the non-drive axle will have just enough air pressure in the air bags to keep them from buckling. This means that the air bags may have only 3- 5 psi and appear to be deflated during an inspection. In these situations, inspectors will not list a violation for the deflated air bags on the non-drive axle or place the vehicle out of service since the suspension system is working as intended and in accordance with the manufacturer's design. If the inspector encounters a situation where the vehicle is fully loaded and one or more of the non-drive axle air bags is deflated, the inspector will follow normal procedures for a deflated air suspension system.