



RVs & Trailers: From a Suspension Point of View

(Part 2 of 3) by Martin Bouchard

The e-mails and comments received at the NATM trade show regarding Part 1 of our White Paper were numerous. After discussing the smooth-ride feature when a trailer is empty, we can now discuss how suspensions work when a trailer is fully loaded.

Towing and Control, a Complex Issue

Controlling your trailer or RV is a complex and dynamic phenomenon involving the centre of gravity of the trailer, weight of the towing vehicle, speed, tires, tongue weight, weather conditions, road surfaces, vehicle sway- control technology, driving abilities, load position in the trailer, etc.¹ This complex dynamic is unique to each vehicle combination but all things being equal, the suspension on a trailer or RV is a key factor in relation to this issue.

Standard Torsion Suspension when Fully Loaded

Standard torsion suspension is considered by the vast majority of trailer and RV users as a high-end product. However, having a standard torsion suspension when the

trailer is fully loaded directly impacts the control and stability drivers have on trailers or RVs regardless of the vehicle combination.

The behaviour of vehicle combinations has been studied through various tests performed by professional drivers: pulse steer, step steer, tow-vehicle understeer, to name a few. An average driver may not realize how serious sudden lane changes or manoeuvres to avoid obstacles can be, because a portion of the load will shift from one side of the trailer to the other, causing a possible loss of control. Standard suspensions literally collapse under such a transfer, especially when the trailer is fully loaded. A linear spring-rate suspension will simply worsen the situation. Once the load transfer has started, a progressive suspension acts as a damper to reduce the unwanted tossing of the trailer.

The Answer: An Adapted Spring Rate

Capacity is a key consideration in the axle market. Unfortunately, this is the only criteria given by the manufacturer and requested by consumers. A neglected but very important element to look at is most certainly the spring rate of your RV or trailer suspension. An adapted spring-rate suspension improves control and increases the stability of the vehicle combination.

¹ For additional information on vehicle dynamics, please refer to Richard Klein's presentation at the Seminar "Current issues in Designing Trailers" held in Elkhart and organized by the RVIA, March 5th, 2009.

Standard torsion axles do not offer enough resistance to counter-balance the load transfer when a trailer is at full capacity.

One Product for a Range of Loads ... An Impossible Dream ?

If capacity is important when thinking about suspensions, how you reach capacity must also be taken into account. The simple consideration of spring-rate ratio may help improve the ride of a trailer or RV.

Manufacturers should look for smooth-ride suspension when a trailer is empty as well as avoid load transfer issues when fully loaded. The JIT Axle progressive suspension achieves both simultaneously ... in a single product.

The axle and suspension industry must inevitably adapt to the megatrends towards smaller towing vehicles. The smaller and lighter the towing vehicle, the more important other factors which affect vehicle-combination behaviour become. Towing a trailer behind an 80,000-pound cement truck will not affect driving. In fact, you do not even feel the trailer behind you. On the other hand, towing a trailer with a car or an SUV will definitely be felt by the driver. That's why trailer suspensions have become such an important issue in the past few years. Would anyone consider buying a new car with a 1950's suspension ? Not likely. Unfortunately, consumers today are forced to purchase towable units sporting an antiquated 50-year-old suspension design.

The series

[Part 1](#) and 3 of this article discuss suspension in RV and trailer industry. Please visit our web site or send an e-mail to newsletter@protorsion.com to be informed of the release of the part 3. If you are interested, we also suggest to read part 1 of this article. You can let us know your comments on this article by sending an e-mail to info@protorsion.com

Author

Martin Bouchard works for 5 years in trailer and trailer parts distribution industry. Prior to that, he also worked 7 years in marine industry. Now Vice-President of [Pro Torsion](#), he can be reach at martin@protorsion.com

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