

Weight distribution optimization

By Kent Mansker

hen it comes to tank trailers, every pound counts. Not only that, the location of every pound counts. When you reach the weight limit for an axle or set of axles, you have to stop loading whether or not you have capacity left elsewhere, so you want to be sure the tractor/trailer combination is configured to reach the limit for all axles at the same time.

When we are building a new trailer, we look for the lightest components and reduce weight wherever possible, while maintaining the performance characteristics and structural integrity with the necessary safety factors. The goals are



always Safety, Reliability and Efficiency. By meeting those goals, you maximize the efficiency and minimize the cost per mile.

When designing a liquid tank trailer, the ideal tank volume is determined by adjusting the tank capacity so that the anticipated trailer weight, the tractor weight, and the product weight at the maximum fill level add up to the desired Maximum Gross Weight. If the tank is oversized, the payload is reduced and you are carrying extra tank weight. If the tank is undersized, the fill limit is reached before the weight limit, and you aren't transporting as much product as you could be. Either way, your cost per mile goes up.

Operational requirements change during the life of a trailer. There can be tractor changes, such as going from a Day Cab to a Sleeper, or going from the heavy duty tractor of a few years ago to one of the extremely lightweight versions available today. Equipment on the trailer changes also. Going from dual tires to widebase singles, changing to a different pump/ motor combination, or adding or removing equipment based on changing requirements. There are also changes in the way a trailer is used. For example, changing from long haul to short distance delivery, or to transport between two locations. Any of these changes can necessitate reevaluation of the weight distribution for maximum efficiency.

"Whatever changes come along, you need to be able to optimize the weight distribution between the axles to get the largest payload"

Whatever changes come along, you need to be able to optimize the weight distribution between the axles to get the largest payload you can get.

Adjustment of the fifth wheel plate on the tractor shifts weight between tractor axles. Adjustment of the kingpin position on the trailer shifts weight to or from the trailer to the tractor. Moving the kingpin forward shifts more weight to the trailer tandem. Moving the kingpin toward the rear takes weight from the trailer tandem and adds weight to the tractor.

A trailer built to allow enough kingpin adjustment to match the tractors at each end of your fleet's weight and length spectrum and distribute the proper load to the trailer tandem maximizes payload and efficiency.

Complicating these adjustments is the fact that, in the US, we must comply with the Federal Bridge Law. For the 80,000 lbs gross weight, you must have at least 51 feet between the front axle of the tractor and the rear trailer axle. AND you must have 36 feet between the rear trailer axle and the front axle of the tractor tandem. This allows 34,000 lbs on each tandem.

Increased payload per trip means higher efficiency, fewer miles traveled per pound delivered, and lower cost per mile. It is well worth your time and money to be sure not only that the weight of your fleet has been minimized, but that the distribution of that weight has been optimized. \$

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