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NRSPP Thought Leadership: Principles of Weight Distribution on Flatbed Trailers for Safety and Success

Loading a flatbed trailer incorrectly can cause a huge variety of safety and equipment issues. One only has to look at the hours of YouTube compilations of heavy loads falling from flatbeds to know how high the stakes are. However, these are the extreme exception, rather than the rule — the vast majority of flatbed cargo loads arrive at their destinations with no accidents or injuries. What are the secrets that truckers use to keep these enormous loads safe and secure?

The key lies in understanding how weight is distributed between the axles of a flatbed trailer and how to properly secure each type of cargo. In this article, we'll examine some of the key factors that will influence how you distribute your cargo weight and secure your load.



Safety Technologies

Two [types of flatbed trailers](#) are widely used in trucking today: sliding tandem axle and spread axle. The differences between these two axle configurations dictate strategies for weight distribution. Each type of trailer also has its own set of advantages and drawbacks regarding stability and maneuverability. Briefly summarized, these include:

- Sliding Tandem Axle Trailers
 - o Axles are spaced closely together
 - o Tandems can be moved forward or backward together to affect which axles the load sits on
 - o More maneuverable in small spaces and
 - o generally preferable when driving on surface streets



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- Spread Axle Trailers
 - o Longer wheelbase increases stability and tracking, and makes bumps less risky
 - o Require a larger turning radius and are generally less maneuverable
 - o Usually heavier than tandem axle trailers
 - o Generally a better choice for very heavy flatbed loads, as their improved stability makes load positioning less sensitive

Calculating Proper Load Positioning

Calculating the correct positioning for a flatbed load is a delicate science that many professional truckers spend years learning. With a variety of fifth-wheel and axle configurations available on different trailers, many different variables come into play.



However general tips for correctly balancing a load include:

- The [Heavy Vehicle \(Mass, Dimension and Loading\) National Regulation](#) states the various mass limits of heavy vehicles. These are dependent on the particular vehicle, axle, and tyres.
- Before you start thinking about loads, you'll need to know the weight of your cab, trailer, and a full tank of fuel. Approximately 4 litres of diesel fuel weighs about three kilograms, so remember that on a 400-litre tank, you'll be hauling an extra 300 kilograms of fuel. Remember to count these numbers toward your general mass limits.
- Some trucks have steer axles and tires that are rated for above 5,500 kilograms, but these are usually specialty rigs for hauling ultra-heavy loads. In general, plan for the above weight limits.
- With a tandem axle trailer, you'll have options available for positioning the tandems toward the front or back of the trailer. As a basic rule, the weight positioning changes thus:
 - o Axles are spaced closely together
 - o Tandems can be moved forward or backward together to affect which axles the load sits on
 - o More maneuverable in small spaces and
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Additionally, sliding the fifth wheel forward increases the load on the steer axle, while sliding it back increases the load on the drive axles. Remember that you'll also be constrained by state regulations dictating the [kingpin to tandem length](#) of any given trailer.

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Securing Your Load Correctly

The other piece of the flatbed hauling puzzle is making sure your load is secured correctly. Load securement is an entire field of knowledge of its own, but we'll scratch the surface here. The first step is to familiarize yourself with the National Transport Commissions, or NTC Load Restraint Guide, which vary for each type of cargo.

The most common types of cargo securement devices for flatbeds include:

- Chains/Straps/Tie-Downs: The primary methods of securing most flatbed loads. They use a variety of tightening mechanisms, such as straps or winches, as well as a variety of anchor points, such as D-rings or stake pockets welded or bolted to the bed, to hold cargo securely against the bed of the trailer. When purchasing tie-downs, examine the working load limit, which is the maximum weight that the device can hold safely, as well as the break strength, or the weight level at which the device will give way.
- Tarps: Necessary for hauling dirt or aggregates such as gravel, sand, etc. Tarps are also highly advisable for a long haul where weather conditions are uncertain.
- Cradles and Bunks: Wooden or metal devices attached to the bed that block the cargo in and prevent it from shifting. Truckers often use these to secure items, such as large boulders, that don't have a flat base to rest on.
- Flags/Banners/Signs: Serve as a caution to other drivers, either by informing them with a simple message ("Oversize Load," etc.) or by flagging hazards they may not immediately see, such as overlong cargo protruding off the back of a trailer. Some flags will come with their own mounting devices; [you can also use heavy-duty cinch straps](#) to securely attach them to cargo such as lumber or pipes.