Benefits of a self-steer axle

In the current economic climate that we find ourselves in, more and more effort needs to be done to save costs, in order to be more competitive. With a volatile Rand and fossil fuel price, the cost of transporting goods is negatively affected. Reducing fuel consumption not only brings down operational costs but also reduces the environmental impact that transportation in distribution traffic has. A lot of focus is always placed on having a fuel efficient and environmentally friendly truck-tractor but little is done on the trailer. However, there are a variety of solutions for the trailer to be more efficient. Energy efficient transport is now more important than ever.

Benefits achieved with a self-steer axle

The BPW self-steer axle shows its benefit when it comes to **distribution transport**. When a rigid three-axle semitrailer drives around a corner, large side forces act on the first and last axle thereby increasing tyre wear and fuel consumption. The large side forces also have an effect on the lifespan of vehicle frame. When the last axle of the three-axle aggregate is replaced by a self-steer axle, the side forces are distributed more evenly. As a result, it has been shown that the life of the tyre on the front axle increases by up to 50% while that of the rear axle can increase by as much as 70%. Figure 1 gives comparison of tyre replacement of a tridem rigid and tridem steered (last axle is a BPW self-steer axle) over a time period of 1,000,000 km travel. In addition, the fuel savings is also plotted on the same graph. The tridem rigid would use approximately 66 tyres over a time period of 1,000,000 km of travel while the tridem steered only 24 which equates to a tyre saving 42 tyres. The fuel saving can be as much as 10,000 L.

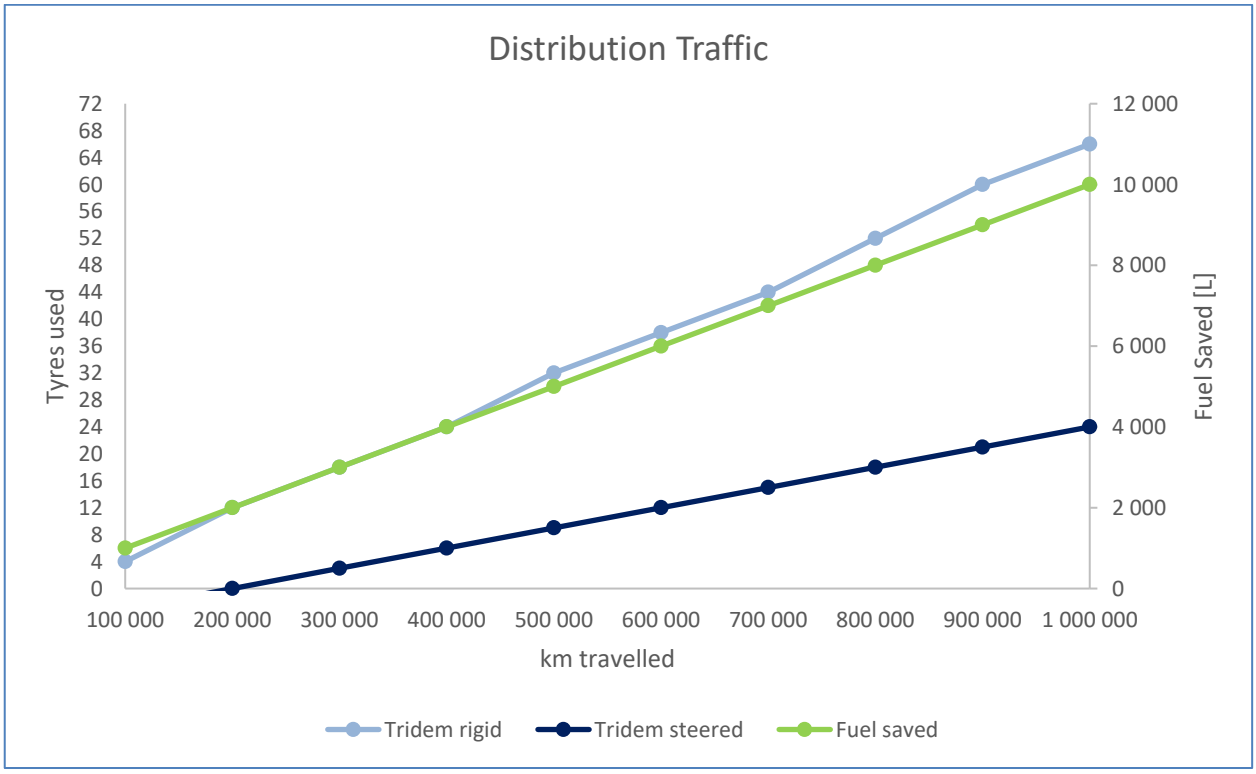

Figure 1

The following reference values, as the minimum fuel savings, can be expected when a self-steer axle is used:

- 6% in distribution traffic
- 4% in mixed traffic
- 2% in long distance traffic

In addition, the BPW self-steer axle also guarantees compliance with turning circle regulations. With a self-steer axle, the inner turning radius is increased (see Figure 2) which makes for smoother cornering and reduces the risk of hitting the roadside kerb.

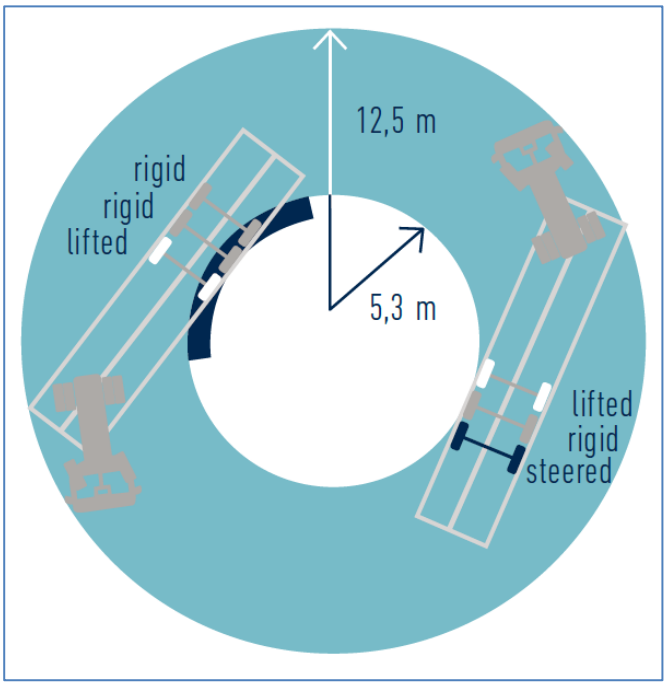

Figure 2

Functioning of the self-steer axle

When the trailer drives around a corner, the wheels of the BPW self-steer axle turn in their natural direction of travel. The self-steering function ensures that the wheels are turned to follow the radius of the corner, allowing the wave pressure thrust washers to slide against one another. The steering angle is set according to the load and is controlled purely mechanically. The axis of rotation of the wheel is located behind its swivel joint, see Figure 3. This arrangement is similar to the castor effect of an office chair, i.e. in straight line travel the weight of the load acting on the wave pressure thrust washers keep the wheel stable behind the swivel joint. The BPW self-steer axle operates without the need for power assisted stabilisers.

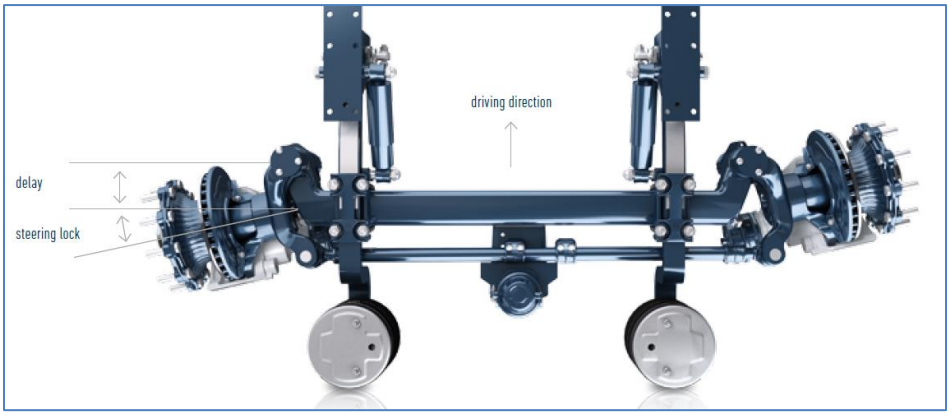

Figure 3

The steering knuckle – in some detail

Figure 4 shows a cut-out view of the steering knuckle. The king pin is a shrink-fit into the axle beam. The steering knuckle has two bronze bushes, top and bottom, and together with grease ensure a smooth turning operation. At the top of the steering knuckle a compression spring is housed which ensures the return of the wheel into the straight line when travelling in the forward direction. At the bottom of the steering knuckle are two wave pressure thrust washers. When the vehicle goes around a corner these wave pressure thrust washers open up and move along each other thereby compressing the top mounted compression spring.

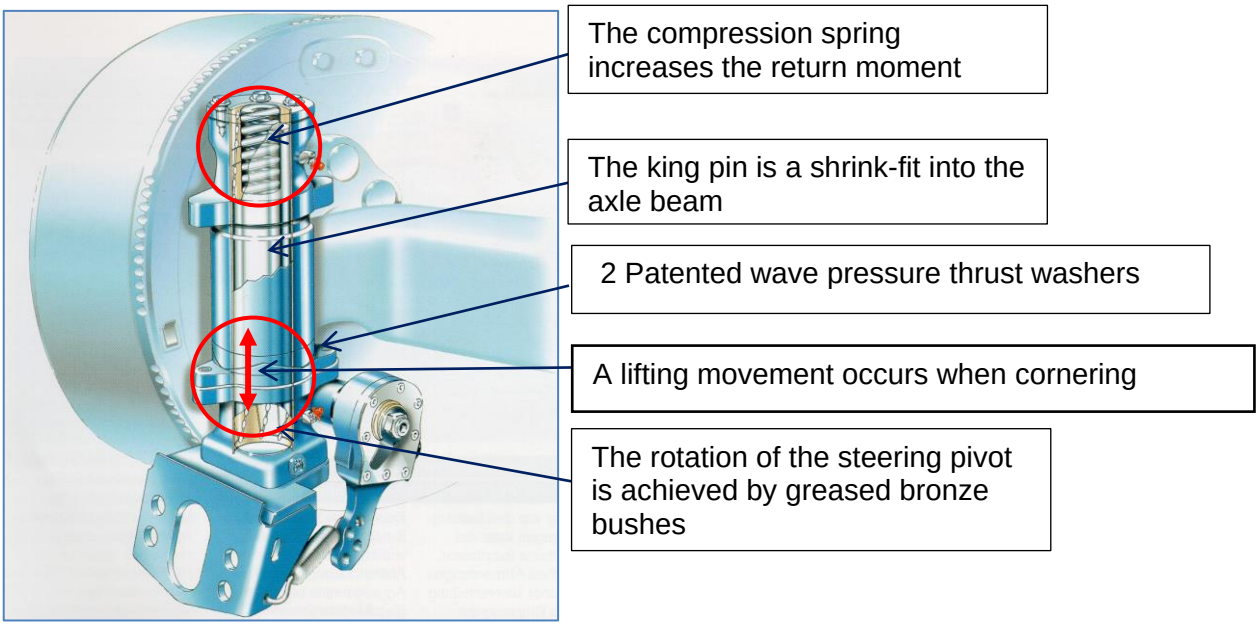

Figure 4