Are Alignments on Trucks and Buses a GREEN procedure or a Money Drain (Part 6)

If we are not going to use Caster or Camber to control the direction the truck moves then I suggest we use the drive axles. Consider an outboard motor boat. When the motor is aimed to the left the boat steers to the right. Aim it straight ahead and the boat goes straight ahead. On flat ground a truck will do the same thing. However we do not drive on flat ground. In North American, we drive on the right side of a crowned road. In other words the road slopes to the right and because of the effects of gravity, the truck wants to pull to the right.

Back to the outboard motor example, when crossing a current flow like in a stream, if the flow is from your left you have to aim the motor slightly to the right to push the nose of the craft into the current in order to cross the stream. On a single drive axle vehicle the same rule applies. Aim the drive axle very slightly to the right, about 1/32nd inch shim, and the front of the vehicle will push up against the crown of the road and counter the "down hill" effect of gravity. Aim it too far to the right and the vehicle will pull to the right because the drive force is now pushing in the same direction as the force of gravity.

We have found there are four drive settings of a single drive axle vehicle. Aim it left and you get a right pull. Aim it straight and you get a right pull. Aim it slightly to the right and it drives straight. Aim it too far to the right and the vehicle pulls right again.

Tandem drive vehicles have another force that needs to be taken into account. The "scrub" angle between the drive axles creates a force that must be addressed. Ideally we would like to set both drive axles perfectly parallel to each other, however in the real world that is virtually impossible. They are held in position with rubber bushing and air bags while under 17,000 lbs weight per axle and transferring the horsepower from the engine to the road. Depending on the model of suspension the give, flex or compression of the support components can allow small or large changes to the alignment in dynamic conditions.

Since I cannot be confident that the axles will remain perfectly aligned to each other, we find that setting a slight scrub angle between them is more effective. By aiming the front drive slightly left and the rear drive slightly right we create a "scrub angle"

or “cone” between the drive axle that causes the vehicle to push against the crown of the road and counter the gravitational effects of the slope of the road. An example of this is your tapered coffee cup. Lay it on its side and roll it. The cup will roll in the direction of the smaller end of the cup. Similarly, by keeping the narrow gap between the drive axle on the left side of the vehicle, the force created by the “scrub” angle assists in fighting the effects of gravity.

None of the settings we use are outside of factory specs and we avoid the issues associated with camber and caster adjustments.

One other point of drive axle alignment, The drives need to be centered under the frame when measured from side to side. Like our old friend the outboard motor boat, if the motor is mounted off center, the drive force is off center, and the push will drive the vehicle in the opposite direction.

70% of steer tire alignment tire wear issues we see are related to drive axle alignment. This means that the most important alignment setting you make is with the drive axle where most of the weight and all the horse power is located.

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