Training notes from the woods & the classroom

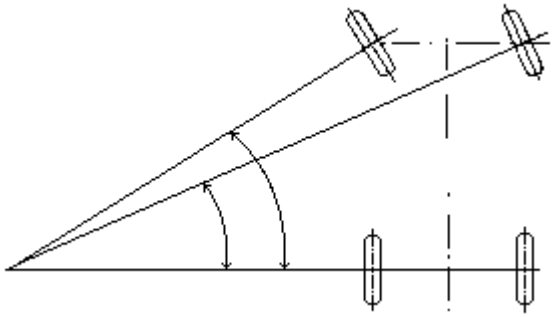
February 2010

Center Point Steering

By Paul Schultz

A customer recently called and asked if an old used truck that we have for sale has center point steering. Well, I've never heard that term before so I asked around and wouldn't you know, the only one that knew what it meant was my Dad Don! Most of you know that Dad's been selling trucks here literally since before I can remember so it was no surprise that he knew!

Turns out that the term "Center Point Steering" goes back to the days before trucks had power steering. In a nutshell it means easier front steering. That's accomplished through true "Ackerman Angles". The principle of Ackerman Steering is the relationship between the front inside tire and the front outside tire in a corner or curve where the inside tire turns tighter than the outside tire. For example, in a left turn the left front tire or inside tire, travels a shorter distance through the turn than the right front tire. That's because the inside tire turns in a shorter radius than the outside tire. To accommodate this difference in radius or distance the steering geometry is such that the inside tire turns tighter than the outside tire.



This allows both tires to roll around a common point in a corner or curve and greatly improves cornering ability, performance and reduces tire wear. Rudolf Ackerman patented his design of angled steering arms in England in 1818 for horse drawn carriages. Before this principle was developed horse drawn carriages were fitted with parallel steering arms and suffered from poor steering performance. Since then Ackerman Steering has had a huge impact on many different vehicles.

Modern cars do not use *pure* Ackermann steering, partly because it ignores important dynamics, but the principle is sound for low speed maneuvers. Some race cars use *reverse* Ackermann geometry to compensate for the large difference in slip angle between the inner and outer front tires while cornering at high speed. The use of this geometry in race cars helps reduce tire

temperatures during high-speed cornering but compromises performance in low speed maneuvers.

If you think about it, the same geometry also applies to the back axle. That's why rear axles have differentials. The diff allows more power to go to the outside wheel so it can travel farther while turning. Otherwise the radius difference would cause binding and result in tire wear.

That's why it's harder to turn when the diffs are locked in because all the rear tires are trying to turn the same distance so it wants to go straight. Multiply that by eight tires and the effect while trying to turn is definitely noticeable and requires an adjustment to your driving technique. And with a tri-drive it's even worse because now you have twelve tires all trying to go straight.

In fact, I spoke with a driver of a tri-drive Michigan log truck last week and he said he doesn't like the handling when they're all locked up and actually preferred his tandem drive because it handled better in the turns. I was surprised when he said the tri-drive doesn't result in getting stuck less often and he said they rotate the tires more frequently because it has more tire wear. But that's only one opinion; the next guy might prefer the tri-drive.

Getting back to the Ackerman principle, another consideration is related to lengthening or shortening a wheelbase. If the Ackerman angles aren't changed with a wheelbase change you can see from the diagram that the tires will not roll around a common point and the result will be increased front tire and steering gear wear.

Drive Safe!

"Fools live to regret their words, wise men to regret their silence." – Will Henry

(Content courtesy of the Great Lakes Timber Professionals Association – February 2010 – *Great Lakes TPA* Magazine and Paul Schultz, Schultz Equipment – www.schultzequipment.com)

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