

MD Alignment

Alignments on Trucks and Buses (Part 4)

Now I will discuss the infamous “Specifications” that vehicle alignments are set to. As a member of the American Trucking Associations Technology and Maintenance Council, I participated in the original task force that developed RP 642 Guidelines for Total Vehicle Alignment. This RP was published in 2000. Membership in the task force included representatives from the major truck, axle, tire and alignment equipment manufacturers doing business in North America at that time.

As I recall, it was in one of the early meetings in 1997 that the subject of “Specs” came up and a survey of the participants revealed a variety of opinions on what was the correct “preferred setting” and the acceptable “tolerances” that should be used. The specifications from each of the companies were collected and put on a spread sheet for study. The comparison showed that the vehicle owner could have 4 different specs to set the alignment depending on the make of the vehicle, axle, tire and alignment system. Change tires on the vehicle and you now have a different spec. Move to another alignment system and that spec may change. Because of this confusion, the group decided to establish some alignment “targets” for alignment settings. These “targets” are numbers the group could all agree were acceptable and did not include “tolerances”. They were intended as goals to shoot for, not necessarily obtained.

My thoughts at the time went in another direction. I wondered how the various manufacturers came up with their “specs” and I took the meetings as an opportunity to talk individually with the reps to learn their development process. After several conversations I found that they all told the same basic story with, in general, only changes of names, dates and locations. I will now present a “Readers Digest” version of the development process as I perceived it. I will further simplify the story by only addressing one alignment factor, Drive Axle alignment.

Long ago and far away in the land of engineering, a junior chassis engineer was assigned the task of establishing the specs for the alignment of the drive axles. The individual retired to a place of relative peace with all the tools and reference materials needed and contemplated the problem. The first obvious conclusions were that the axles should be centered laterally under the frame and at a 90 degree angle to the

MD Alignment

frame. With this concept firmly in mind the engineer consulted with the industrial engineer who oversaw plant operations. The industrial engineer pointed out that the zero off center and zero angle specs might be perfect in an ideal situation, they were not building trucks under ideal conditions. The frame rails are not all “perfectly” identical. Neither are the leaf springs, spring hangers, axle pads and axles. Similar but not identical means that a stack of manufacturing tolerances can significantly effect the final alignment. As a result, chassis alignment is included in the manufacturing process, but that portion of the build is only allowed 7.5 to 9 minutes in most plants and perfect alignment of one or two drive axles is not possible on 250 to 300 vehicles per day.

Time and motion studies at the work station determined the limits that were possible with currently available alignment systems and so preferred specs and acceptable tolerances established. Variables such as part time help and vacation fill in workers were added in and finally specs were published to reflect what was possible for alignments on vehicles leaving that operation. Those are the specs that are used to set the alignment on many vehicles today.

The point of this story is that “Factory Specs” are “Build Specs” NOT “Performance Specs”. When a customer brings in a vehicle for alignment because he is experiencing tire wear or handling issues, aligning it to “Factory Specs” usually does not solve the problem.

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