



## New Generation Wide Base Single Tires

### Background

New Generation Wide-Base Single (NGWBS) tires were designed to replace a set of dual tires at the tractor drive and/or trailer positions. They were designed to be interchangeable with the dual tires without any change to the vehicle. The new 445/50R22.5 tire replaces 275/80R22.5 duals, and the 455/55R22.5 tire replaces either 11R22.5 or 275/80R24.5 tires. Both Michelin and Bridgestone offer the 445/50R22.5 size while only Michelin offers the 455/55R22.5 size of these new tires.

Goodyear has not yet entered the market. The information contained in this document was collected from ATA members and published sources. It is meant to be a summary of available information at the time of publication.

### Advantages

The main advantages are that the new wide base tires weigh less than duals, approximately 800 lbs less when combined with aluminum wheels on a five axle combination, and fleets have reported savings ranging from 1% to 8% on fuel on the same combination vehicle. This amount of fuel savings is not easy to obtain, and where the weight savings can be exchanged for payload there is an even better return. The use of these tires is recognized by EPA's *SmartWay Transport Partnership* as a clean freight strategy by their ability to reduce fuel consumption. A SmartWay study published as an SAE paper showed reduction in fuel use of 6% at 55 mph, 12% at 65 mph and 10% in a suburban loop. The NOx reductions were 36%, 30% and 13% respectively.

Advantages of NGWBS tires can include reduced tire wear in some applications, increased payload capacity due to lower weight, improved fuel efficiency, and improved vehicle ride and handling. Ultimately this should result in improved profits for motor carriers. The NGWBS tires were developed using parameters provided by state highway agencies to minimize any negative effect on pavement. They meet the inch width-weight limits for all states, but are restricted in certain states to 17,500 lbs on a single axle at 500 lbs/inch width limit, and are disallowed on single axle positions on certain double and triple combination vehicles. The NGWBS tires are not to be confused with the "old" "Super Singles" used primarily on construction vehicles. That would be like comparing old bias ply tires to new radials.

Information on the NGWBS has been slow to come out since their introduction in 2000, but most poor perceptions are diminishing. These perceptions include safety issues related to sudden deflation, increased pavement damage, and lack of availability in the field. Poor perception by some could also be based on some truckers running with one dual tire at each wheel end on axles designed for two duals.

There have been many tests conducted to prove that NGWBS do not pose a handling problem in event of sudden deflation, this is supported by real world experiences. Many tire issues today are the result of under inflation. The fact that the inner dual is sometimes difficult to check compounds this issue. This situation is improved with the use of NGWBS, enhancing ease of tire maintenance and reducing the potential for field problems.

Although not a requirement, tire pressure monitoring systems can help drivers' awareness of the air level in WBS tires. This may prevent premature air loss and reduce the number of flat tires. Many users have also cited that the brakes stay cooler on their vehicles due to improved air flow with a WBS tire and wheel set up.

Comments from fleets in northern climates include improved traction and feel in snowy conditions. When designed as original equipment on tankers, the center of gravity can be lower due to more space between the inside side walls on WBS tires compared to a dual set.

Overall availability has improved significantly and continues to improve as more fleets adopt the technology. Fleets report that availability is no longer an issue. Since they are interchangeable with standard size duals, a pair of tires and wheels can be purchased in an emergency.

An occupational benefit is a proven reduction in dolly maneuvering force providing a safer environment less likely to cause injury. Fleets have reported dramatic reductions in back injuries from maneuvering and hooking up dollies. Drivers have also widely reported favorable on-road handling characteristics.

The Technology and Maintenance Council of the ATA has drafted a Recommended Practice (RP) "Guidelines for Outset Wide Base Wheels for Drive/Trailing Axle Applications". The RP will discuss the effects on wheel bearing load with the WBS shift of centerline from duals..

Finally, NGWBS appear to result in less scrap since they contain fewer sidewalls compared to a pair of dual tires. This, however, depends on the number of miles between retreading and the number of times that is done. Although some users have reported that they have successfully re-treaded WBS tires two times with no issues.

## **Disadvantages**

One down side is that until the entire fleet has converted two sets of wheel hardware must be maintained. In some operations such as a 10 ft spread tandem these tires are reported to have durability problems. Just as there have been reports of better tread wear than duals in some applications, there have been reports of less tread wear in other applications. Mixed results on wear have come from members we have polled. The jury is still out on whether these NGWBS have comparable tread wear to the duals they replace, or if they can be successfully recapped the same number of times. It appears that local or city operation, as well as spreadaxle applications, can result in significantly faster tire wear due to curbing, stone drilling, and scrubbing.

Some fleets have reported higher scrap rates for casings (as high as 40%). Today these tires only represent an estimated 0.5% of the 17.5 million tires sold each year in the US. For trucking companies operating cross border operations, the fact that these NGWBS are not allowed in Canada can be an issue.

While the older "Super Single" tires increased wear on pavements, these new tires are wider and can operate at lower air pressures. They have been measured to be close to neutral as far as road damage.

Through studies conducted by Dr. Al-Qadi of the University of Illinois Urbana-Champaign, NGWBS tires have been found to produce slightly more stress and strain under the top layer of asphalt layer (HMA) than traditional dual tire assemblies. This type of wear is related to fatigue damage. However,

he emphasizes the amount is negligible. In the same studies, NGWBS are also less damaging to pavement in top down cracking, which is initiated by tire edges. NGWBS have only two edges compared with traditional wheel ends with four edges, thus they stress the road less in that mode. Dr. Al-Qadi is continuing his studies and improving the modeling software to analyze road stress from tires.

Other studies in addition to Dr. Al-Qadi's, have been completed on NGWBS tires, both independent and sponsored by manufacturers, while varying in results, the effect of the NGWBS on roadways is comparable to that of dual tires. Steer axles are still the primary source of road damage.

However, at present time the biggest disadvantages of NGWBS tires may be out-of-date state laws and regulations still on the books which restrict the use of single tires, intended to prevent "singling out" of wheel ends designed for dual tires, as well as regulating the previous era of "Super Singles". ATA engineering has a spreadsheet available of the latest regulations that prohibit "single" tires that can be interpreted as a prohibition on WBS tires also. Work is ongoing with the states to clarify regulations.

## **Conclusions**

The potential benefits to ATA members include improved fuel economy , reduced un-sprung weight (~700 lbs/ five axle combination vehicle) which helps improve handling, lower cost (~\$130/wheel end for certain applications), reduced maintenance and improved safety due to improved ride and handling in all weather conditions.

These benefits would have to offset the wear and recap questions mentioned above to complete the payback picture. Users need to consider their application, dollars saved, and return on investment. Further testing is expected to be completed and will be followed closely by ATA Engineering to verify whether the NGWBS tires continue to be a positive change.

Study and knowledge sharing on WBS tires is continuing with a consortium led by the Federal Highway Administration. The first meeting had representation from academia, government agencies including Canada, France and South Africa, tire manufacturers and end users represented by ATA.

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