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Future Tire Retreads and Repairs

Developed by the Technology & Maintenance Council's (TMC)
Future Tire Reliability/Productivity Task Force

ABSTRACT
This TMC Future Truck Position Paper defines future performance requirements of retreaded tires and tire repairs according to fleet and end user descriptions of their needs and concerns. This will include all aspects of retread tires, tire repairs, and associated maintenance issues.

INTRODUCTION
This TMC Future Truck Position Paper defines future features and expectations for retreaded tires and repair in terms of product performance, maintainability, reliability, durability, serviceability, environmental and educational issues. The purpose of this paper is improving retreaded tire value to the fleet/equipment user.

PERFORMANCE EXPECTATIONS
The focus of retreaded tire performance is ultimately to reduce tire "cost per mile." With continued advancements in retread technology, retreads should provide equal or greater removal mileage than original treads. Future retreads should be more tolerant of irregular wear and vehicle misalignment. Future retreads should provide better traction, in all conditions. Traction, tread wear, rolling resistance, fuel economy, durability and lower noise levels should be equal to or greater than original tread tires. Vibration and the need to balance the retread/wheel assembly should be reduced.

The appearance of future retreads should be equal to that of original tire appearance. Future retreads should better dissipate heat and be more resistant to heat from operations.

Arbitrary limits of age and/or the number of retreads will not be required to maximize cost per mile since tires must be retreaded many times to achieve one million miles on the casing. Therefore, casing retreadability should be determined by the condition of the casing rather than its age or number of retreads.

Technology & Maintenance Council (TMC)
2200 Mill Road • Alexandria, VA 22314 • Ph: (703) 838-1776 • FAX: (703) 684-4328
tmc@trucking.org • http://tmc.truckline.com

Repairs need also to be able to eliminate bulges that occur as a result of sidewall section repairs. In the future, repairs will last the full lives of the casings and will ensure tires maximize their useful lives. Technology may be developed for better inspection methods and repair procedures, which do not require that the tire be demounted.

MAINTAINABILITY EXPECTATIONS

The appearance of future retreads will be equal to that of original tire appearance yet will be easily distinguished as a retread for the purpose of product performance analysis. The tread will be aligned straight as like the original tread or molded square over the belt package. Retread rubber will have improved adhesion to the casing with minimal heat, further improving durability of the casing. Retreads will maintain the balance of the casing and not require additional weight.

Repairs may be easier to install and more forgiving of placement. They should last for the life of the casing and maintain sidewall flexibility. Bead repairs should be easier to perform and provide a seal to the rim flange to prevent air leakage. Spot repairs in a casing sidewall should not allow ozone cracking any faster than the rest of the sidewall.

An anti-ozone treatment should be developed and applied to sidewalls and bead areas to improve casing appearance and total casing life performance. Sidewall repair of severe scrubbing should be developed to extend tire life in operations where curbing is a constant concern.

Casing inner liners will allow easier recognition of a run flat or underinflated condition. This must be accomplished by the original tire manufacturer. Innerliners can be self-repairing and nonporous to better maintain the inflation medium. At minimum, inner liners must continue to improve on their compatibility with repair materials and procedures. Belt packages or body plies will corrode less over time, making repairs faster, easier and more durable.

Repair material manufacturers should make a repair unit that can be applied to the exterior of a casing reinforcing the injured area making it capable of carrying the load for a temporary distance.

RELIABILITY EXPECTATIONS

Retreads of the future should be more reliable in all operations at all times, given proper application. Retreads should be able to operate at higher sustained speeds in all climate conditions, and must minimize any occurrence of casing component and/or retread failure, any internal air pressure loss due to faulty repairs and be balanced for life to reduce any irregular wear.

Future retreads should reduce the need for warranty claims through better inspection technology and tire tag data. Machines or other devices should thoroughly inspect casings from bead-to-bead and provide an analysis of the various components. Even the slightest anomalies or separations should be detected and repaired before the retread or repair process is allowed to begin. Better-trained technicians should be educated on advanced inspection techniques, which should give them the necessary tools for evaluating casing conditions. Better-trained technicians should also be able to help users determine a realistic cost/benefit threshold for repair and retread.

By starting with a sound casing, future retreads should operate at the same level of performance as new tires. Through advanced tire tag data, future casings should provide retread technicians with an accurate inflation, temperature, and mileage history. This will enable them to determine the type of service the casing is best suited for. Any repair and/or retread will be retained in the “memory” of the casing, giving the opportunity to determine

whether vendors are providing quality workmanship. These tire tags should be readable when mounted on the vehicle and enable technicians to enter data during fleet inspections and other types of service. Future retread and repairs should continue to meet and/or exceed the requirements of all legislative regulations.

DURABILITY EXPECTATIONS

In order to achieve one million cumulative miles, original tread tires will have to be retreaded several times. To obtain this level of durability, future retreads must mirror the performance of original tires on a mile per 32nd basis as well as other performance characteristics (i.e., irregular wear resistance, traction, noise, etc.). The quality of workmanship of the retread should maximize retread and casing life.

Future retreads should be applied to wide-base tires, low-profile tires, and any other truck tires used in the North American market and should perform comparable to original casings. Fewer tire changes and longer service intervals realized from these actions should reduce tire cost per mile while sacrificing no other performance aspects. Repair materials in future tires should last the full life of the casings and should maximize casing life.

SERVICEABILITY EXPECTATIONS

Future retreads will be marked in compliance with federal and state regulations and should be more easily read. The retreader's DOT identification should be affixed in the immediate vicinity of the original tire DOT number. It should be of a material, size, and placement that will survive severe run-flat damage and still be legible.

Future retreads should have lower rolling resistance and improved fuel economy than today's retreads. Once installed, future tire repairs should be permanently affixed in tires and should not have to removed and replaced during the life of the tire. Allowable repair dimensions will be expanded, as will repairable areas in the tire. The number of necessary repairs and the materials used in the repair process should be reduced and a simpler puncture repair technology be developed.

ENVIRONMENTAL ISSUES

Future retreads and repairs should consider all environmental factors. Solvents and cements should pose no hazards to technicians during the repair process or when empty containers are properly disposed. Advanced recycling technology should enable retreaders to convert all rubber-related scrap and by-products into usable goods. Retread processes should be developed to reduce the amount of buffing (and thus buffing waste) required to prepare the tire to accept new tread. Repair materials should be environmentally friendly at all levels and will incorporate as many recycled products as possible. Tread designs and compounds should give maximum treadwear and traction, and should enhance fuel mileage through lower rolling resistance.

EDUCATION/TRAINING EXPECTATIONS

Future retread/repair systems should require new and more efficient means of personnel training to handle the newest of technologies. A comprehensive, objective, and recognized training program must be readily available, easy to understand and conducted in a short period of time. The tire retread and repair industry must also attempt to improve its products' image to the general public. ❑