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## DETERMINING SUITABILITY OF PNEUMATIC TIRES

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The Bureau of Public Roads has undertaken a great deal of research and investigation for the primary purpose of developing a rational basis of highway design. As a result of this work the Bureau has uncovered facts of the utmost importance to the automotive industry.

One of the most important contributions to the efficiency and economy of highway transportation is the development of pneumatic tires for the larger classes of vehicles and the already virtually complete displacement of the solid rubber tire.

In the design of roads the vehicular factor in which the designer is interested is not the gross weight of the vehicles to be carried, or the dead load of the vehicles at rest transmitted through their wheels, but rather the impact with which the wheels of moving vehicles strike the road surface after being projected slightly into the air on contact with a surface irregularity.

Ten years ago very little was known of the intensity of such impact forces, and, as a better understanding of them was essential, the Bureau of Public Roads set about a study of them. How little knowledge existed is indicated by the fact that there was not even a dependable apparatus with which to measure forces of this character, so the Bureau had first to invent and manufacture the measuring apparatus.

It was not long before it was found that the impacts delivered by wheels equipped with solid rubber tires might be several times as great as those delivered by wheels carrying the same load but equipped with pneumatic tires. Moreover, the speed at which a given intensity of solid-rubber-tire impact was reached was found to be much less than that at which the same intensity of blow would be delivered by a pneumatic tire.

Here was information that was equally useful to the road builder and the vehicle manufacturer, because the same impact that injures the road also in its reciprocal effect destroys the vehicle. It was information that struck the knell of the solid rubber tire; and the process of abandonment has been even more rapid than we hoped for. The result is not only that the cost of highways capable of carrying the heaviest loads is greatly lowered, and the probability of road damage reduced, but vehicular operating costs are also decreased and practicable speeds raised - all of which tends to reduce the cost of transportation.

In the later investigations of motor truck impact the Bureau has had the direct cooperation of the Society of Automotive Engineers and the Rubber Manufacturers Association.

Of similar usefulness to the automotive industry as well as benefit to the public were the results of the Bureau's tests which proved the advantages of multiple axles for trucks and buses. These tests have shown that the demand which a given load makes upon the road surface depends upon the number of wheels on which it is carried and its distribution to the wheels. They have shown that a load carried on a vehicle with two rear axles requires for its support a road surface only half as strong as if it were carried on only one rear axle, assuming the same percentage of the load to be distributed to the front axle in each case.

These findings are the basis upon which the multiple axle vehicle is being developed - another improvement which, carried to its practicable limits of application, will also produce material savings in transportation.

Of the other services rendered to the automotive industry - too numerous to mention individually, and all of them the reciprocal results of activities designed for the public benefit - one only might be mentioned, as of outstanding value. It is the contribution which the Bureau has made to the definition of the economic field of automotive transportation. Made up of numerous detailed findings in the course of the traffic surveys which it has directed in a number of States, this service of the Bureau is of the broadest interest to the automotive industry as well as the public at large.