IMPACT OF VEHICLE LOADS ON PAVEMENT PERFORMANCE

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ABSTRACT

Pavement performance depends mainly on the capacity of road materials and structures to support vehicle loads without considerable deformation and absolutely no failure. Stresses and strains are principally created by vehicle action while influence of other factors (temperature, drainage etc) is less significant for the pavement deterioration process.

Analytical and semi-empirical methods of pavement design and strengthening introduce the loading factor in different ways. A trivial procedure to include the traffic component into calculations consists of a conversion of each vehicle axle into a portion of a standard axle. Consequently, traffic can be expressed as a number of standard or equivalent axles.

In the present study, it is namely stated that the impact of any vehicle axle on the pavement depends on the structure characteristics (geometry and strength). Analytical computations by the finite element programme CESAR -LCPC were executed to estimate conversion factors in different cases.

Comparison of computation results with relevant values from the generally adopted law of 4th power shows the efficiency of analytical methods as well as the risk for serious errors whenever non-national use of empirical formulae is made.

Importance of two other factors, rarely taken into consideration, is also illustrated: coefficient k_1 defining the rate of loading of circulating trucks and coefficient k_2 introducing the lateral distribution of vehicles in the traffic lane.

Analytical or empirical attempts for designing and rehabilitating road pavements should take into account all these factors in order to obtain maximum accuracy in computational applications.