

DYNAMIC LOAD EFFECTS OF HEAVY VEHICLES ON PAVEMENT PERFORMANCE



An investigation examining the impact of dynamic loads, magnified loads, moving loads, surface damage and tyre contact areas.

With the heavy vehicle industry requesting bigger, heavier trucks be allowed on WA roads it is essential that the implications of these vehicles on our roads be understood. As most of our roads are not completely smooth, research into this area is vital to ensure our road network is up for the future challenges of a growing number of heavy vehicle road users.

Background

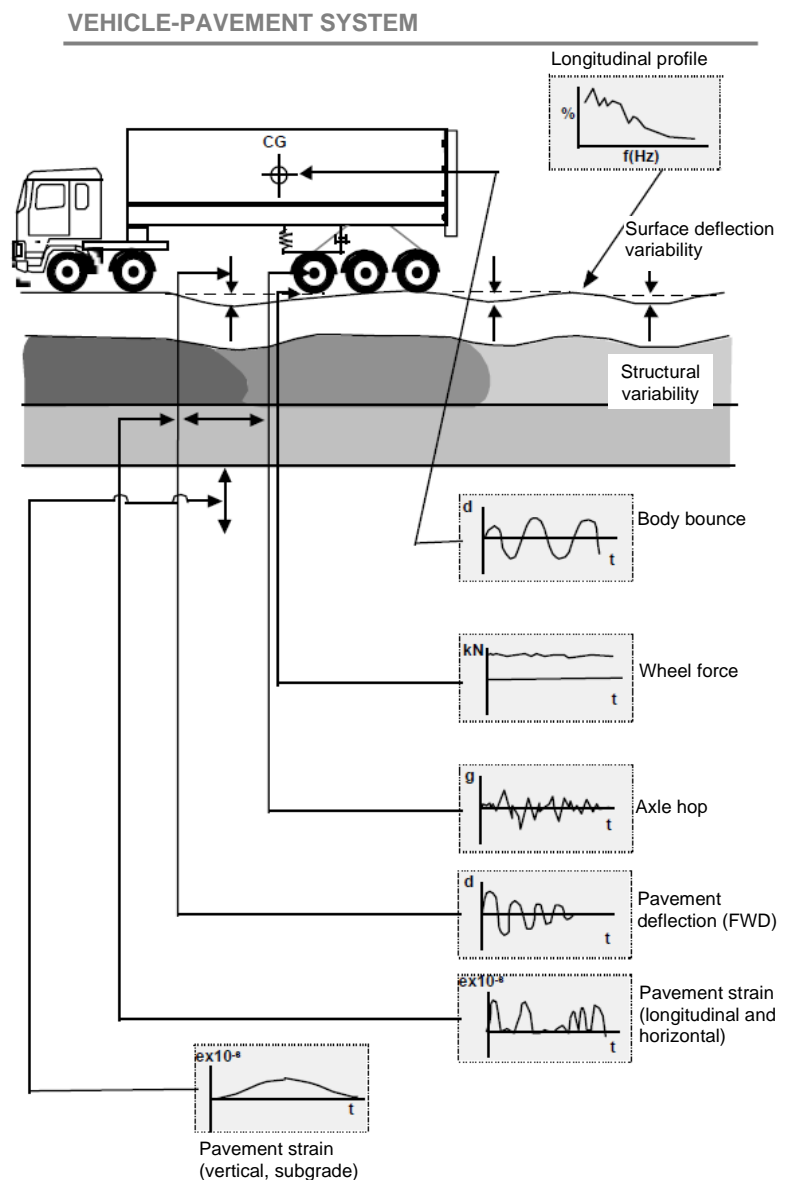
Dynamic loading is the constantly varying load of a vehicle due to internal and external factors while moving along a road. Consideration of the dynamic effect of heavy vehicles on pavement performance is a complex issue. This project investigated the many factors involved so that Main Roads can have a consistent and informed approach for assessing requests from heavy vehicle operators to operate with more closely spaced and heavier axles.

Approach

- Literature review aimed at understanding the current state of knowledge
- Recommendations for further studies based on the findings of the literature review

Findings

- Several studies have been conducted to understand the increase in load magnitude that is imparted to the pavement due to dynamic effects.
- Still many knowledge gaps that need to be investigated to better understand all the impacts and effects related to dynamic loading.
- Modelling of horizontal loads imparted on the pavement is complex, with limited software packages available that can estimate the magnitude of these stresses.
- The current state of knowledge in this area only allows for prescriptive requirements to be imposed on heavy vehicle operators and general guidelines to be available for pavement designers.



Source: OECD 1998.





Further Studies

There are many aspects involved in considering the effect of heavy vehicle dynamic loading on pavements. A list of ideas for further studies to allow further understanding of these aspects and potential implementation of learnings was produced, which includes the development of:

- a method for estimating the dynamic loads under trucks tyres
- pavement damage models based on predicted dynamic loads to allow quantification of costs of pavement damage caused by the increase in load magnitudes caused by dynamic effects
- models to predict pore water pressure accumulation and asphalt viscoelastic behaviour from dynamic effects
- a methodology to refine contact area and pressure distribution in pavement design procedures

ROAD ROUGHNESS IMPACTS ON DYNAMIC LOAD IMPARTED



ESTIMATION OF DYNAMIC LOAD UNDER TRUCK TYRES NEEDED

