

**PAVEMENT CONDITION MEASUREMENT BY TRAFFIC SPEED
DEFLECTOMETER (TSD) IN GERMANY – APPLICATION STATUS
GERMAN RESEARCH FOUNDATION (DFG)
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Motivation**

In view of the fact that pavements have to carry more and more heavy traffic the life time of pavements will be more and more uncertain. To prevent pavements from sudden failure, pavement management systems were developed in order to establish a maintenance strategy with respect to the actual and the historic pavement condition development on network level. At present surface indicated pavement conditions are measured which is necessary but not sufficient. Construction details as number of layers, layer thickness and bearing capacity are almost unknown.

Problem Statement

While structural surface defects (cracking, ravelling and patching), longitudinal and transverse profiles as well as skid resistance are at present measured with traffic speed on network level, the bearing capacity - as a key parameter of structural pavement information - is measured mostly on object levels with equipment which runs very slowly (Curviametro and Lacroix Deflectograph) down to a velocity of 0 km/h (Benkelman Beam and Falling Weight Deflectometer FWD).

Methodology

The Traffic Speed Deflectometer - developed by Greenwood Engineering (DK) - is a trailer truck with a special beam, mounted in an air conditioned trailer (2nd generation). The beam carries the Doppler-Laser-Sensors (1 kHz) which measure the deflection velocity of the loaded pavement surface.

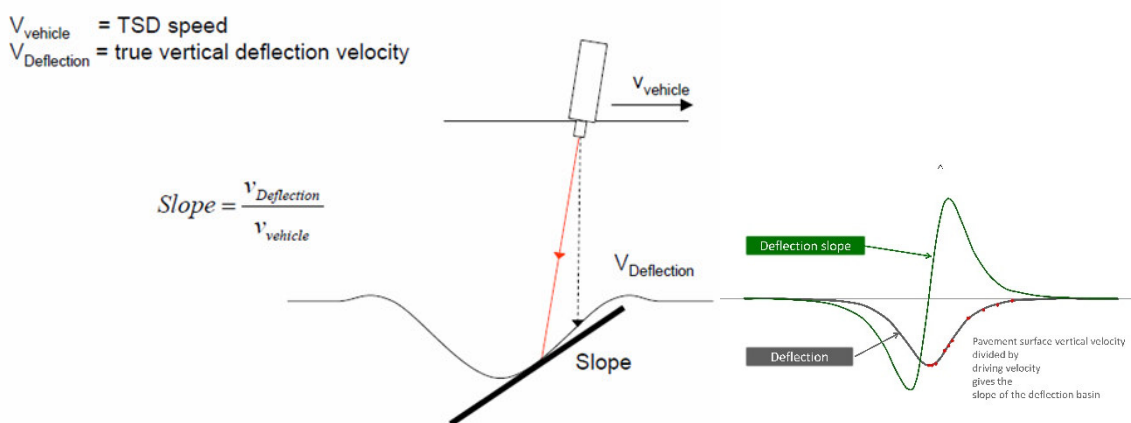


Figure 1 - Principle to develop the deflection bowl [1] and interrelation between measured deflection and deflection velocity [2].

By means of special mathematical treatment with respect to the vehicle speed it is possible to get the deflection basin. The deflection data are used to give information about the bearing capacity. The 2nd generation TSD has meanwhile the option to measure the dynamic axle load.

Results and Discussion

The TSD configured with all the before mentioned measurement devices

- Doppler-Laser-Sensors for bearing capacity
- Right of way imaging
- Dynamic axle load measurement system
- HRM-measuring principle (longitudinal profile)
- Fraunhofer-Laser-Scanner (transverse profile)
- Surface-Imaging-System (cracks and surface defects)
- Ground Penetrating Radar (layer thicknesses)
- Additional Doppler-Laser-Sensors (whole deflection bowl)

will be a multifunctional (all in one) measurement system to record detailed pavement surface conditions at traffic speed. Actual and synchronized information about surface distress, layer thickness, longitudinal and transverse profile, dynamic wheel load as well as bearing capacity based on the deflection bowl will be a very good base to develop a methodology of remaining pavement service life. In this case pavements can be prevented from unexpected failure [3].

Acknowledgement

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