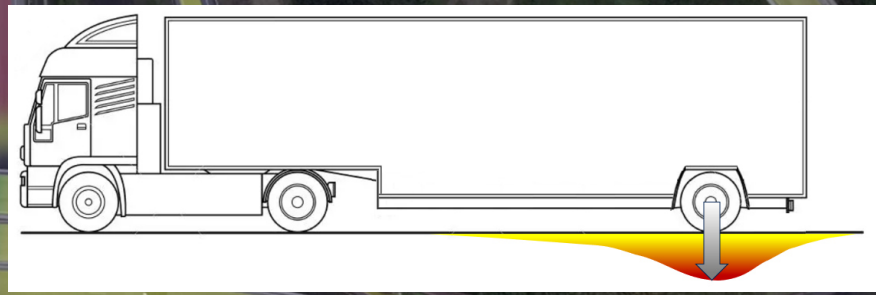
BCRRA conference 2022 – **Workshop**

Usage of TSDDs at network level – what do we have, what is missing

INTRODUCTION TO THE WORKSHOP

Dr.-Ing. Dirk Jansen, BASt



BCRRA2022

11th International Conference on the Bearing Capacity of Roads, Railways and Airfields

Measuring pavement characteristics

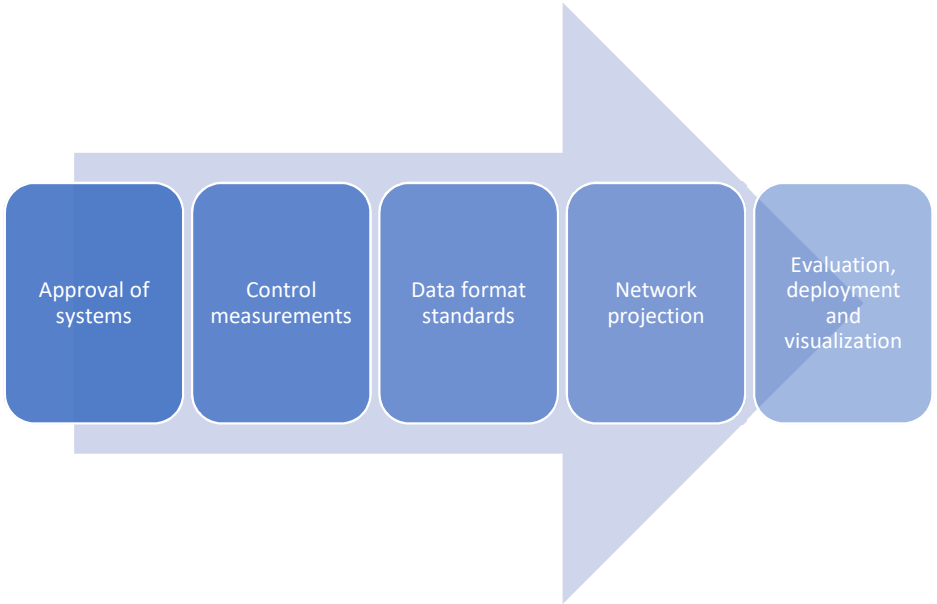
Contractors and clients have a great background of experience regarding

- tendering
- QA/QC
- planning
- evaluation
- reporting
- etc.

on network-level.

Measuring pavement characteristics at AASHO road test

Example:
main parts of standardized ZEB (surface characteristic monitoring) process in Germany
(not complete)



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Obvious differences
- Weight
- Size
- …

Non-obvious differences
- Absolute references
- Operating requirements
- Type and structure of data
- …

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RAMBØLL

RAPTOR
Rapid Pavement Tester

GREENWOOD ENGINEERING

TSD
Traffic Speed Deflectometer

TSDD
Traffic Speed Deflectometer Devices

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RWD
Rolling Wheel Deflectometer

USA – out of service

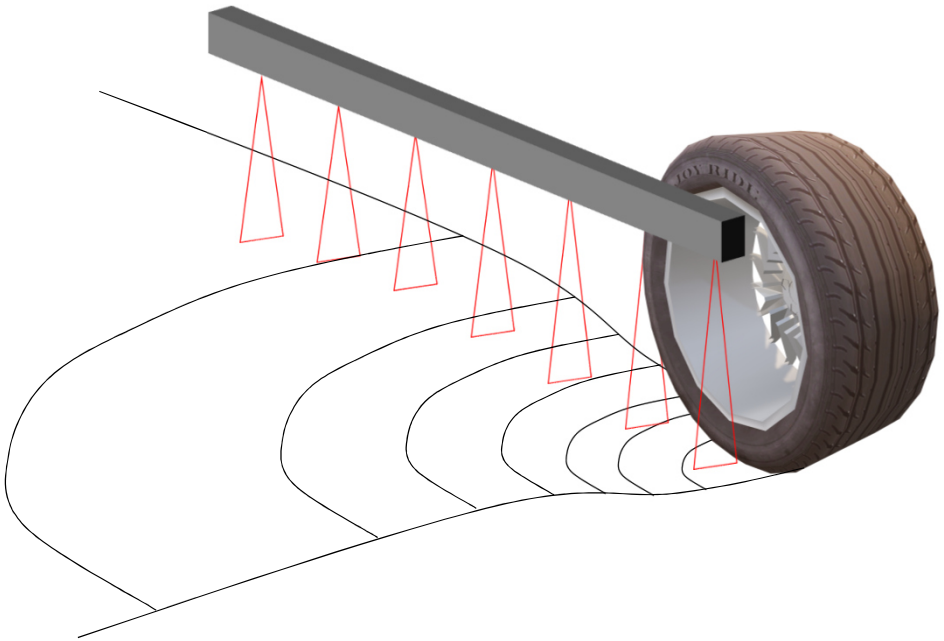
LDD
Laser Dynamic Deflection
Measurement System

China – status unknown

Basics

RAPTOR		*TSD*
Distance line laser	Laser technology for capturing pavement response	*Doppler laser*
Super single wheel	Trailer wheel applies load	*Twin wheel*
~ 1-80 km/h	Measurements at traffic speed	*~ 1-80 km/h*
ROW, IRI, GPR, …	Multifunctional	*ROW, IRI, GPR, …*

RAPTOR

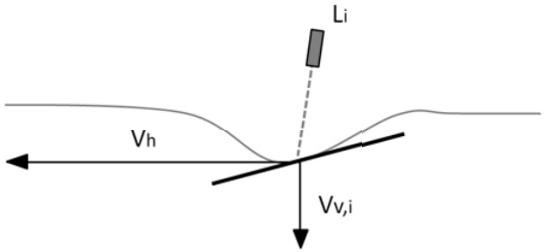


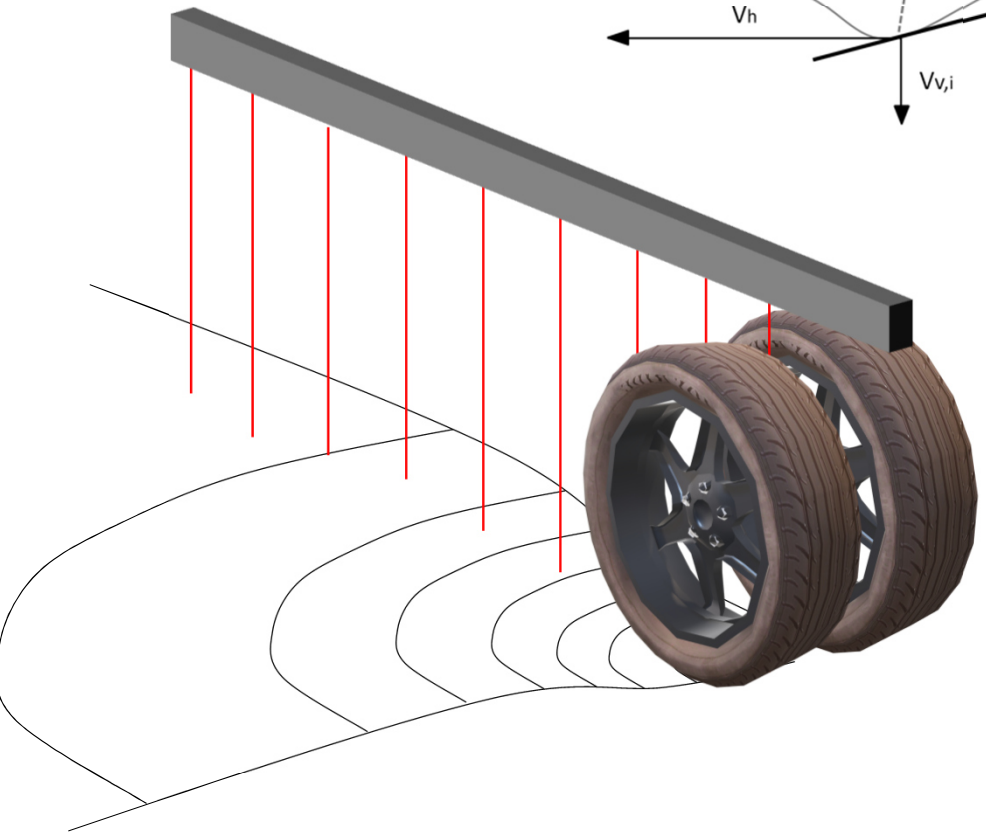
1. Line scan laser measures distance and gives a characteristic pattern/image for its position at t_0
2. Laser positions at t_1 will be matched with t_0 position by image recognition
3. Delta of distance at laser positions and curvature between laser positions will be calculated
4. Generalized pavement model will be used to calculate deflections

Results

- Deflections
- Deflections bowl
- SCI_{300} and similar

TSD



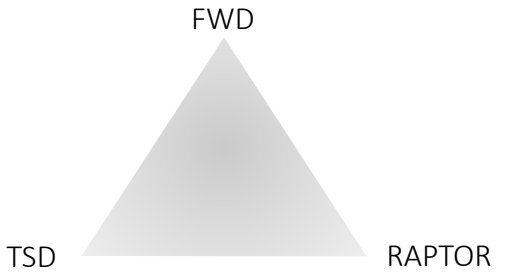


1. Doppler laser sensors measure vertical pavement velocity
2. Slope of pavement at sensor position results from horizontal velocity (driving speed) and vertical velocity
3. Slope values are used to construct a deflection bowl, using mathematical models

Results

- Deflections
- Deflections bowl
- SCI_{300} and similar

Comparability



- Loading characteristic — *impulse, rolling single wheel, rolling twin wheel*
- Sensor positions — *at centre, beside centre, near centre*
- Processing — *integration, derivation, modelling, …*

Measurement result with proof of origin
$SCI_{300,TSD,AM}$, $SCI_{300,RAPTOR}$, …

Statement on the structural condition

Agenda

9.00 – 9.15	*Introduction to the workshop – Dirk Jansen (BASt)*
9.15 – 9.45	*Experiences from Norway – Per-Otto Aursand (Norwegian Public Roads Administration)*
9.45 – 10.15	*Experiences from South Africa: 2016 – 2022 – Simon Tetley (ARRB Systems)*
10.15 – 10.45	*US pooled funded study – Gerardo Flintsch (Virginia Tech Transportation Institute)*
10.45 – 11.15	*Break*
11.15 – 11.45	*Experiences from Poland and Germany – Jacek Sudyka (IBDiM)*
11.45 – 12.00	*Introduction to the panel discussion – Martin Wiström (Ramboll)*
12.00 – 13.00	*Discussion with panel and audience*

Time for questions and discussions after each presentation
and
during "Discussion with panel and audience"

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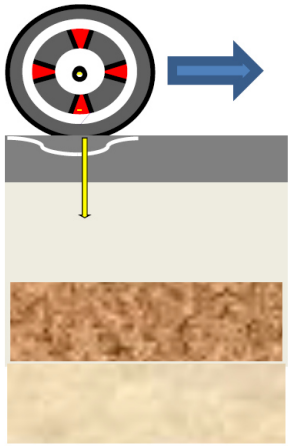

Deflection at Road Traffic Speed - DaRTS

DaRTS17 Meeting

14.00 – 17.00 h, here in this room!

Friends of DaRTS are welcome!

14.00-14.20 Welcome and introductions

14.20-15.00 DaRTS member updates

- 14.20-14.30 Richard Wix (ARRB, Australia). *Update on the activities in Australia*
- 14.30-14.40 Alain Hebting (CEREMA, France). *Update on intercomparison measurements*
- 14.40-14.50 Graham Salt (GeoSolve, New Zealand). *Update on MSD activities in Europe and summary of BCRRA paper*
- 14.50-15.00 Stine Skov Madsen (Ramboll, Denmark). *Summary of the BCRRA paper*

15.00-15.15 Coffee break

15.15-16.15 Technical session 1 (TSDD measurements)

- 15.15-15.30 Marshall Arokia (Greenwood Engineering, Denmark). *Summary of Greenwood activities in relation to BCRRA*
- 15.30-15.45 Samer Katicha (VTTI, USA). *Evaluation of the joints*
- 15.45-16.00 Bjarne Schmidt and Simon Tetley (ARRB Systems, Sweden, South Africa). *Update on ARRB Systems iPAVe Operations in Europe and South Africa*
- 16.00-16.15 Discussion (Issues in measuring rigid pavements)

16.15-17.00 Technical session 2 (Modelling and back calculation)

- 16.15-16.30 Nikolaj Ravn (Greenwood Engineering, Denmark). *Two ways of looking at TSD data – Modelling pavements with back-calculation and estimating strains down to few cm resolution*
- 16.30-16.45 Mahdi Nasimifar and Reza Kamalizadeh (Isfahan University of Technology, Iran). *A Practical Tool for Developing Structural Deterioration Models*
- 16.45-17.00 Discussion (Validation of the models)