Current status of European standardization in the road surface characteristic area

By

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RPUG Road Profile Users' Group

The Swedish National Road and Transport Research Institute

Leif Sjögren, Research director, Infrastructure Maintenance

- conduct research and development related to infrastructure, traffic and transport.
- assignment-based authority under The Ministry of Infrastructure.
- about 200 employees and are located in Linköping (head office), Stockholm, Gothenburg, Borlänge and Lund.

www.erpug.org

The organizers of ERPUG would like to thank RPUG for inspiration and cooperation to making both RPUG and ERPUG such a success

Leif and Roger

ERPUG, EUROPEAN ROAD PROFILE USERS' GROUP

20-30 presentations, 10 exhibitors, almost 100 participants from more than 25 countries around the world

Non-profit organization. The offices and the principle place of business for ERPUG is the VTI.

Serve as a forum for the exchange of information between end users, data collectors, vendors, construction and design engineers and researchers who have an interest in **road profiles, road roughness/smoothness, pavement surface textures, friction, and tire-pavement noise.**

Exhibition

Entertainment

Friends

Presentations

Mingle and food

ERPUG

Foto Ruth Enyedi, Unsplash

Vienna 2020, 14-16 October

Vilnius 2019 16-18 October

Madrid 2017

Prague 2016

Budapest 2015

Brussels 2014

Copenhagen 2013, 2018

vti

CEN, the European Committee for Standardization

- is an association that brings together the National Standardization Bodies of 34 European countries.
- CEN is one of three European Standardization Organizations (together with CENELEC and ETSI) that have been officially recognized by the European Union and by the European Free Trade Association (EFTA) as being responsible for developing and defining voluntary standards at European level.

https://standards.cen.eu/dyn/www/f?p=CENWEB:5

National standards, case Sweden

SS-EN
SS-EN-ISO

Swedish Institute for Standards – SIS

EN
EN-ISO
prEN
TS

ISO

ISO is an independent, non-governmental international organization with a membership of 164 national standards bodies.

CEN committee TC 227

ROAD MATERIALS www.cen.eu

To prepare specifications, test methods, compliance criteria for materials for construction and maintenance of roads, airfields and other trafficked areas. CEN/TC 227 started its work in 1990 and created 5 working groups:

- WG 1 "Bituminous mixture",
- WG 2 "Surface dressing, slurry surfacing",
- WG 3 "Materials for concrete roads incl joint fillers and sealants",
- WG 4 "Hydraulically bound and unbound mixtures",
- WG 5 “Pavement Surface Characteristics"

TC227 Working Group 5

Three task groups:

TG1 Unevenness standards

TG2 Friction /Macrotexture

TG3 External noise standards

Task group 1 Unevenness standards

- Determination of longitudinal unevenness indices, EN 13036-5:2019
- Determination of transverse unevenness, prEN 13036-8:2008
- Measurement of transverse and longitudinal profiles in the evenness and megatexture wavelength ranges, prEN 13036-6:2008

  Suggested title: Classification of equipment used for measurement of transverse and longitudinal profiles
- Irregularity measurement of pavement courses: the straight edge test, EN 13036-7:2003

Longitudinal unevenness indices EN 13036-5:2019

- **IRI**, International Roughness Index, Quarter car filter
- **WLP**, Weighted Longitudinal Profile→ σWLP, ΔWLP
- **Waveband analyzes**
  - Bi-octave bands (French)→SW, MW, LW*
  - Profile variance (UK) 3m, 10m and 30 m LPV

  - *SW=0.707-2.828
  - MW=2.828-11.312
  - LW=11.312-45.248 m

PE 2019

The 5 proposed transverse unevenness indicators

Total transversal unevenness

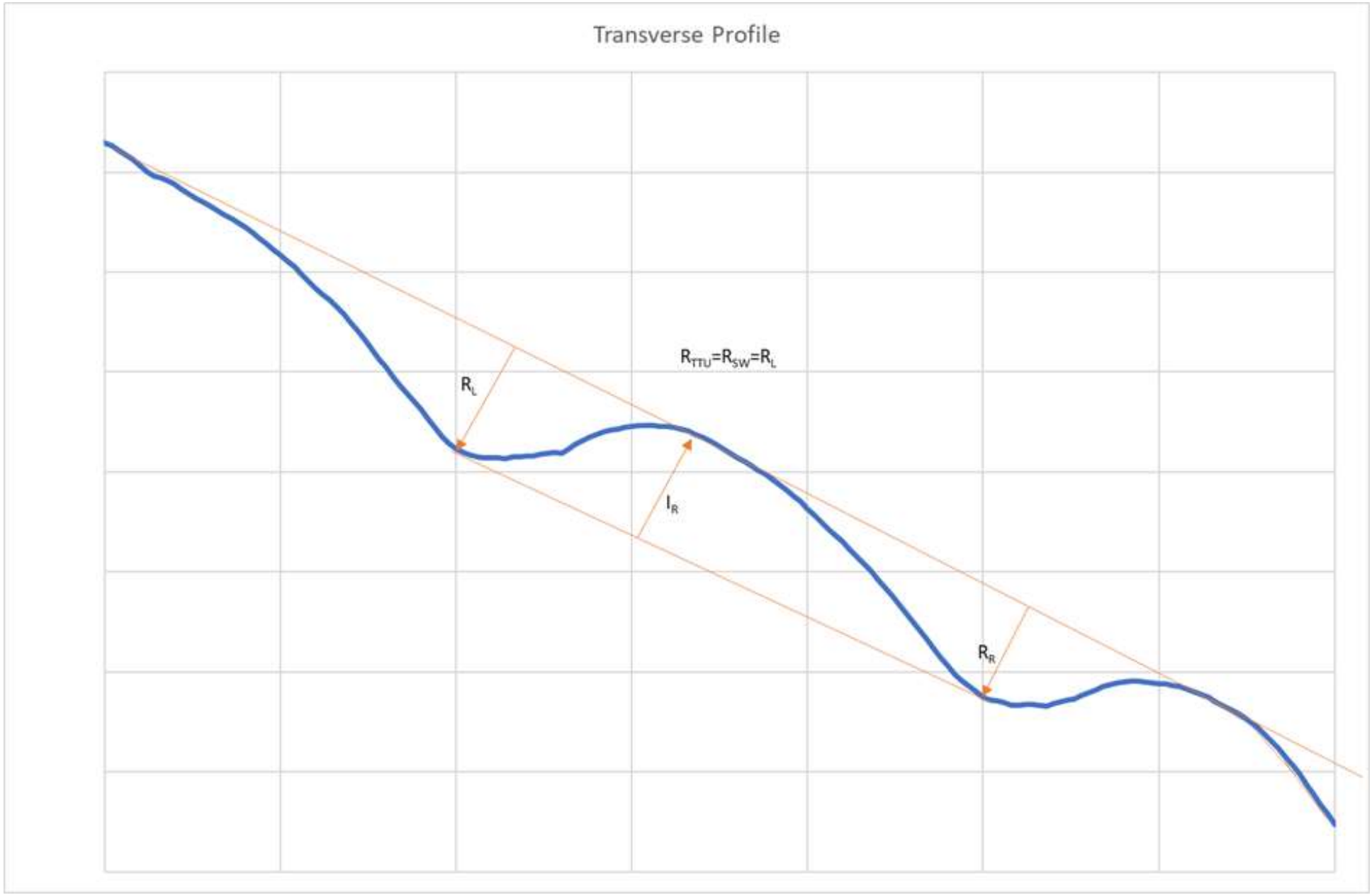
Sliding wire rut depth

Rut depth left

Rut depth right

Ridge height

transverse unevenness, prEN 13036-8:2008



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transverse unevenness, prEN 13036-8:2008

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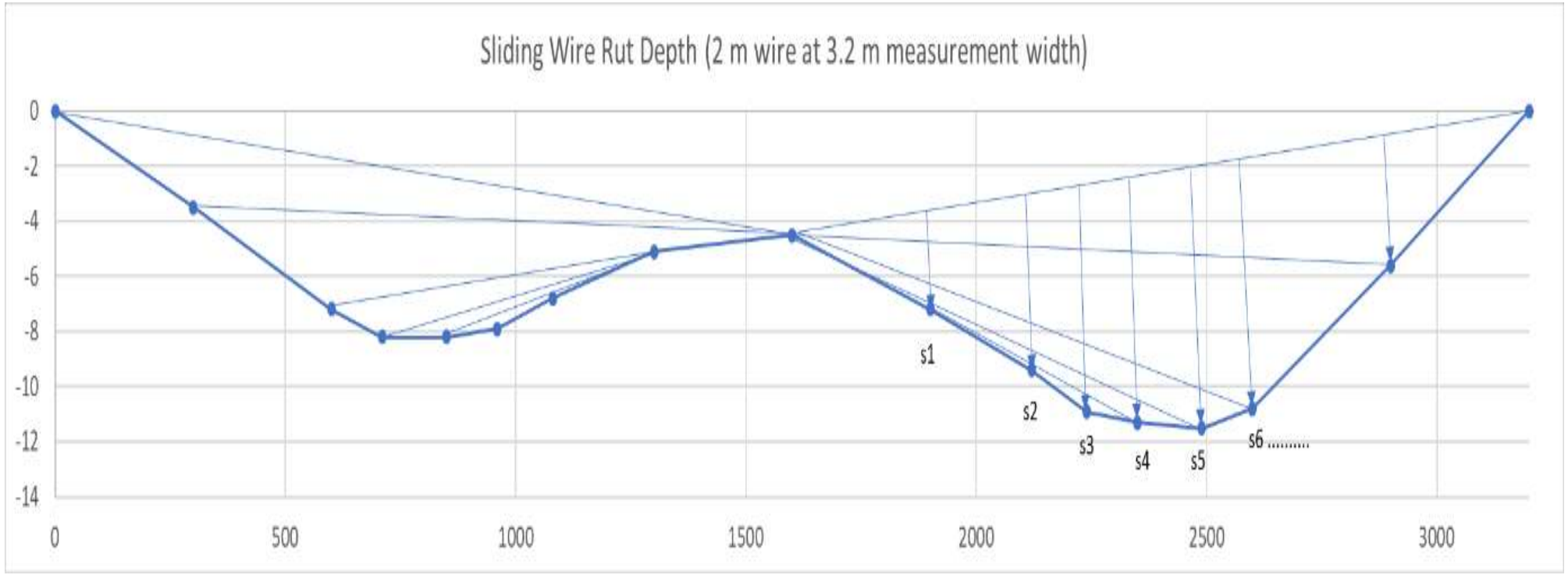
The **S**liding **W**ir**e** **R**ut **D**epth method



transverse unevenness, prEN 13036-8:2008

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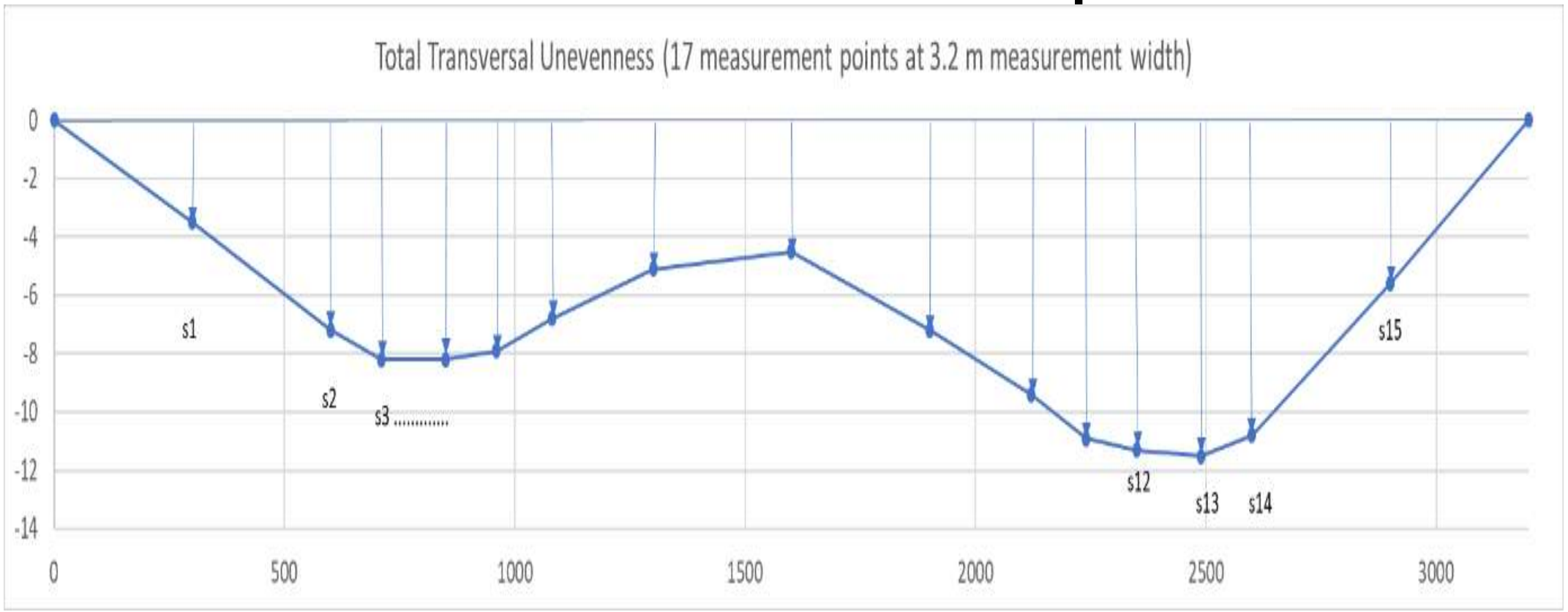
Total transversal unevenness calculated at a 3.2 m wide transversal profile



transverse unevenness, prEN 13036-8:2008

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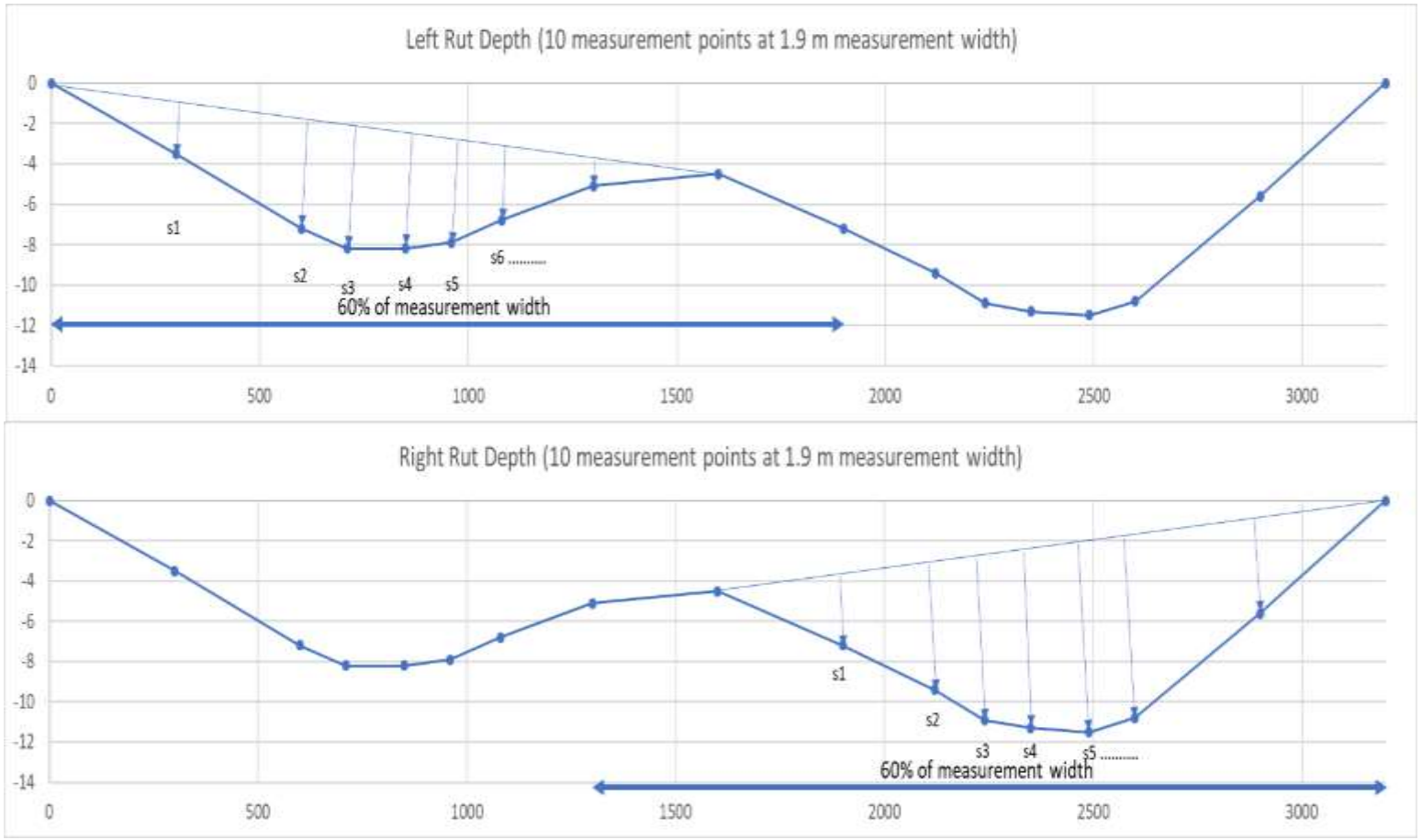
Left and right rut depth calculated at a 3.2 m wide transversal profile



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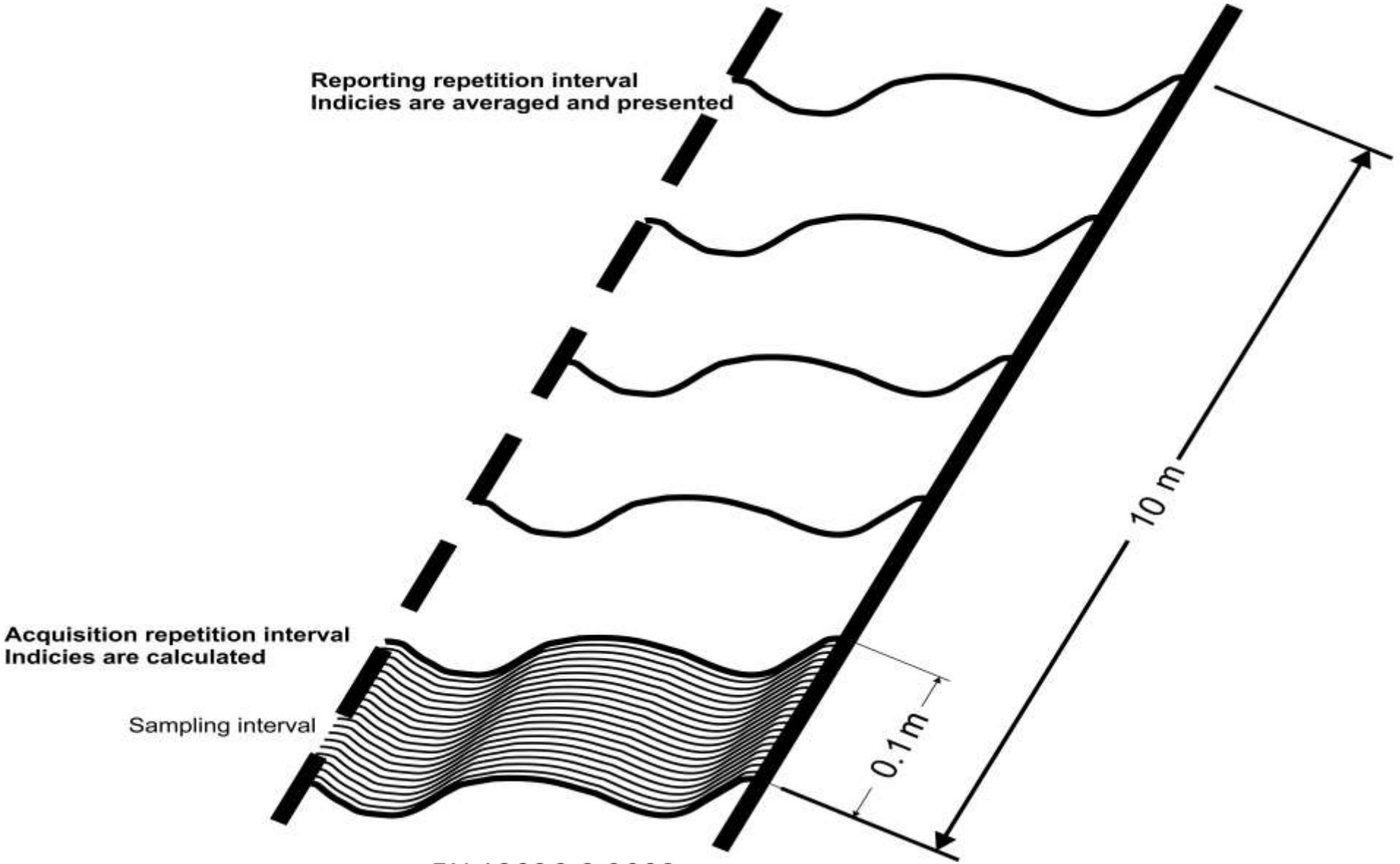

PE 2019 transverse unevenness, prEN 13036-8:2008

Character position	Description	Example
1	Class of travelled distance accuracy	1
2	Longitudinal profiling	L
3	Class of longitudinal vertical resolution	1
4	Class of longitudinal sampling interval	1
5	Class of longitudinal acquisition repetition interval	2
6	Class of large wavelength cut-off	1
7	Class of longitudinal profile measurement accuracy	2
8	Transverse profiling	T
9	Class of transversal vertical resolution	2
10	Class of transversal acquisition sampling interval (sensor spacing)	1
11	Class of transversal sampling interval	2
12	Class of transversal acquisition repetition interval	1
13	Class of transversal reporting repetition interval	2
14	Class of transverse profile measurement accuracy	1
15	Class of transverse gradient measurement accuracy (crossfall)	2

PE 2019

prEN 13036-6:2008

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Classification example

3.3 Vertical sensor resolution of longitudinal profiling

Class 1 ≤ 0,2 mm;
Class 2 > 0,2 mm but ≤ 0,5 mm;
Class 3 > 0,5 mm but ≤ 1,5 mm.

3.9 Acquisition sampling interval of transverse profiling (transversally)

Class 0 ≤ 25 mm
Class 1 > 25 mm but ≤ 75 mm;
Class 2 > 75 mm but ≤ 150 mm;
Class 3 > 150 mm but ≤ 350 mm.

Task group 2 Friction/macrotexture

Working on future friction standard, prEN 13036-2/SFC and LFC:

- Transvers friction, Side Force Coefficient, SFC and longitudinal friction, Longitudinal Force Coefficient, LFC.

- Currently 15 technical specifications, EN TS 15901-1 to 15

Task group 2 Friction/ macrotexture

- Measurement of pavement surface macrotexture depth by using a volumetric patch technique, EN 13036-1:2010
- Assessment of the skid resistance of a road pavement surface by the use of dynamic measuring systems, CEN/TS 13036-2
- Measurement of pavement surface horizontal drainability,

  EN 13036-3:2002
- Method for measurement of slip/skid resistance of a surface – the pendulum test, EN 13036-4:2011

Task group 2 Friction/ macrotexture

- ISO/TS13474-4, Characterization of pavement texture by use of surface profiles: Spectral analysis of surface profiles

The next work is to lift the TS to a full standard.

- ISO 13473-6, Verification procedure for contactless sensors: This will be published as PAS (Publicly availably specification)
- EN ISO 13473-1:2019, Determination of mean profile depth

Task group 2 Friction/ macrotexture

- Characterization of pavement texture by use of surface profiles — Part 5: Determination of megatexture, ISO/FDIS 13473-5
- Characterization of pavement texture by use of surface profiles — Part 6: Verification of the performance of laser profilometers used for pavement texture measurements, WD for DPAS 13473-6 (2017)

Task group 3 External noise standards

- Acoustics - Measurement of the influence of road surfaces on traffic noise:
- EN ISO 11819-1:2001,– Part 1: Statistical Pass-By method. Updated version close to finished
- EN ISO 11819-2:2017, - Part 2: The close-proximity method

Conclusions

Lessons learned: Aim at enough accuracy, lower ambitions

What we need to work on:

- Dynamic monitoring of road strength
- Surface defects including cracks

Future challenges:

- Include environmental indicators (noise, rolling resistance, particulates)
- How to include new innovations
- Bicycle path condition indicators

But most important put focus and effort on Data management and data quality!

Thank you for listening

Transverse profile, Rut Depth, Crossfall

Cross Profile Scanner:

VTI XPS

Trailer with 7 synchronized LMI Gocators 2375 sensors to measure the profile.
OXTS Survey+ to measure the crossfall and get position
Longitudinal spacing = 100 mm
Transverse spacing = 1 mm