



Influence of texture on rolling resistance: experiments in the Netherlands

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Topics

- influence of the road surface on rolling resistance
- road surface types in the Netherlands
- results form previous projects
- measurement program 2013

Influence road surface on rolling resistance

- texture



- unevenness



- road stiffness

Main subjects of the project

- differences in rolling resistance due to
 - different grades of the asphalt
 - the state of maintenance
- accurate texture – rolling resistance model
- primarily focused on passenger cars
- results based on measurements



Silent road pavements in the Netherlands

- dense asphalt
- stone mastic asphalt
- PAC 6/16

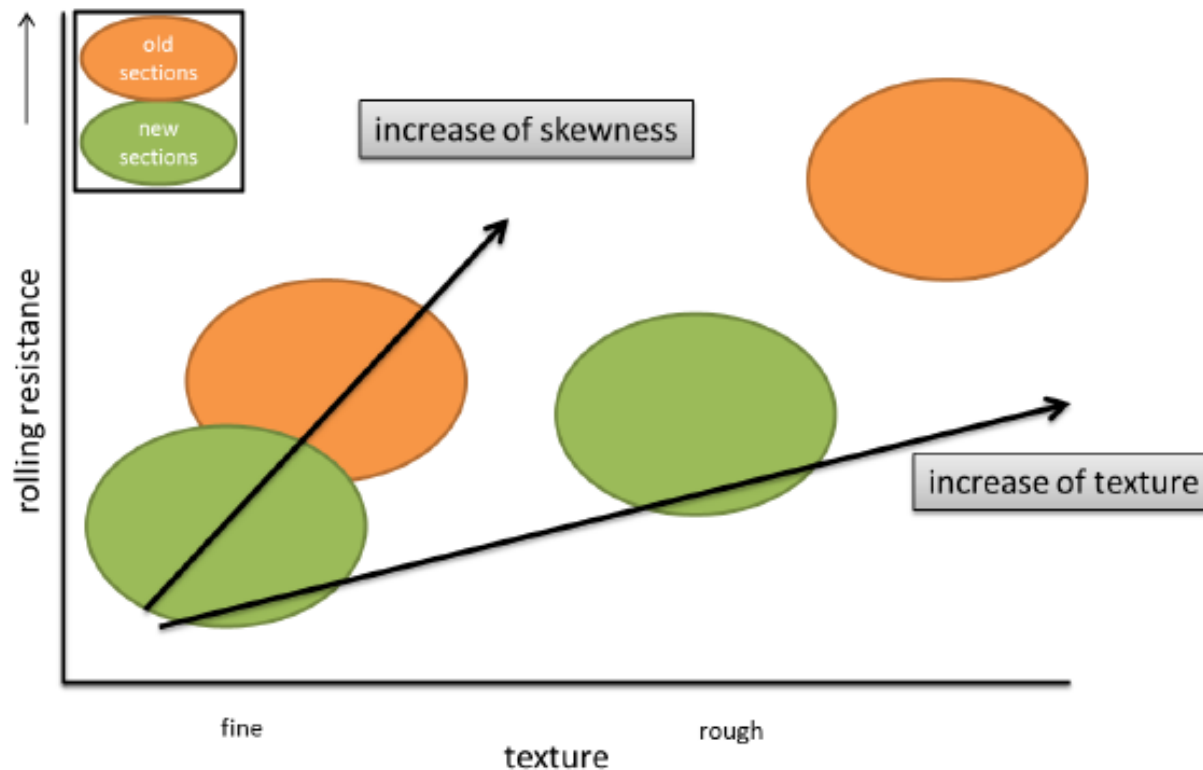


- thin surface layers
- 2 layer PAC 4/8 or 2/6

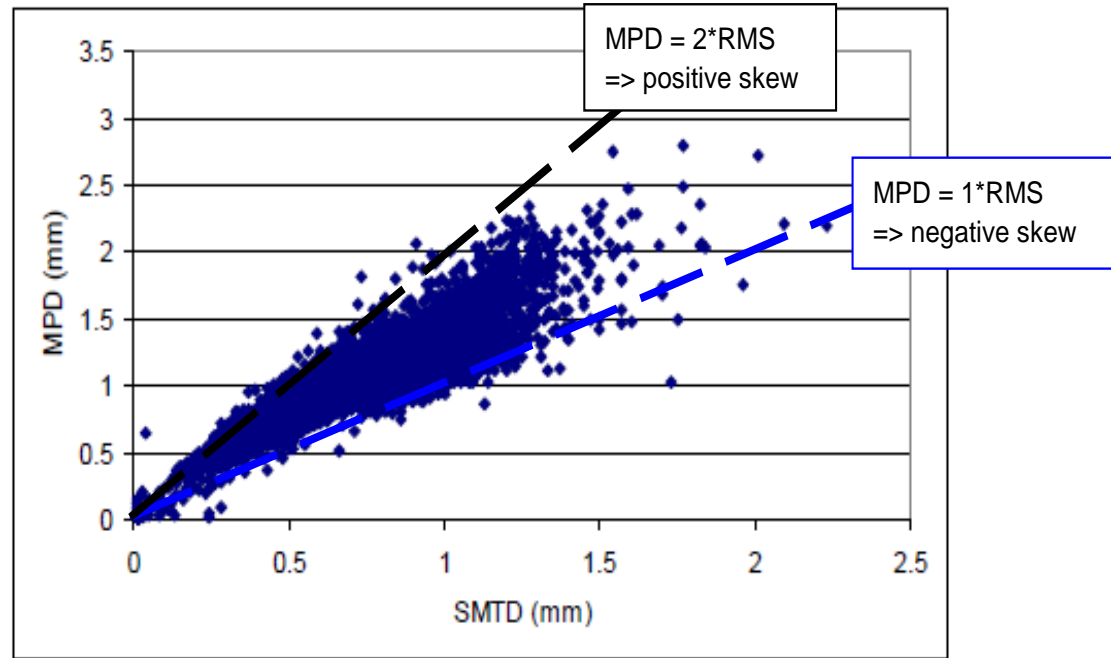
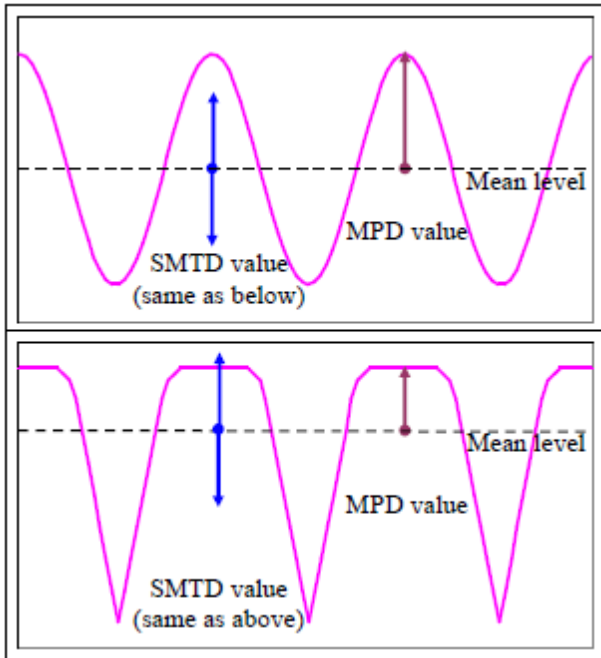


Relevant parameters

- stone size
- texture (positive or negative)
- state of maintenance (ages, damage)

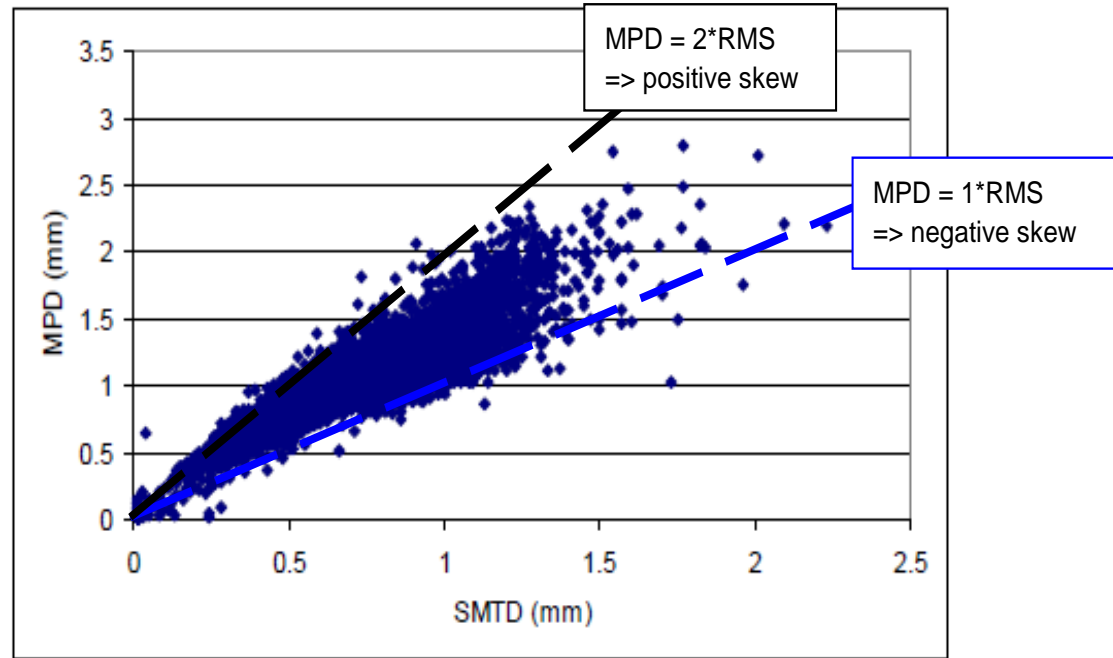
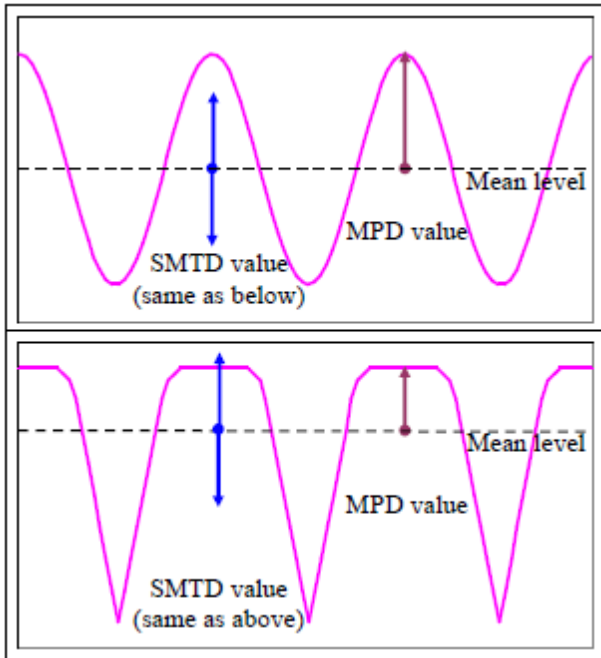


Texture: MPD, RMS and skewness



$$RRc = Const + X \cdot MPD$$

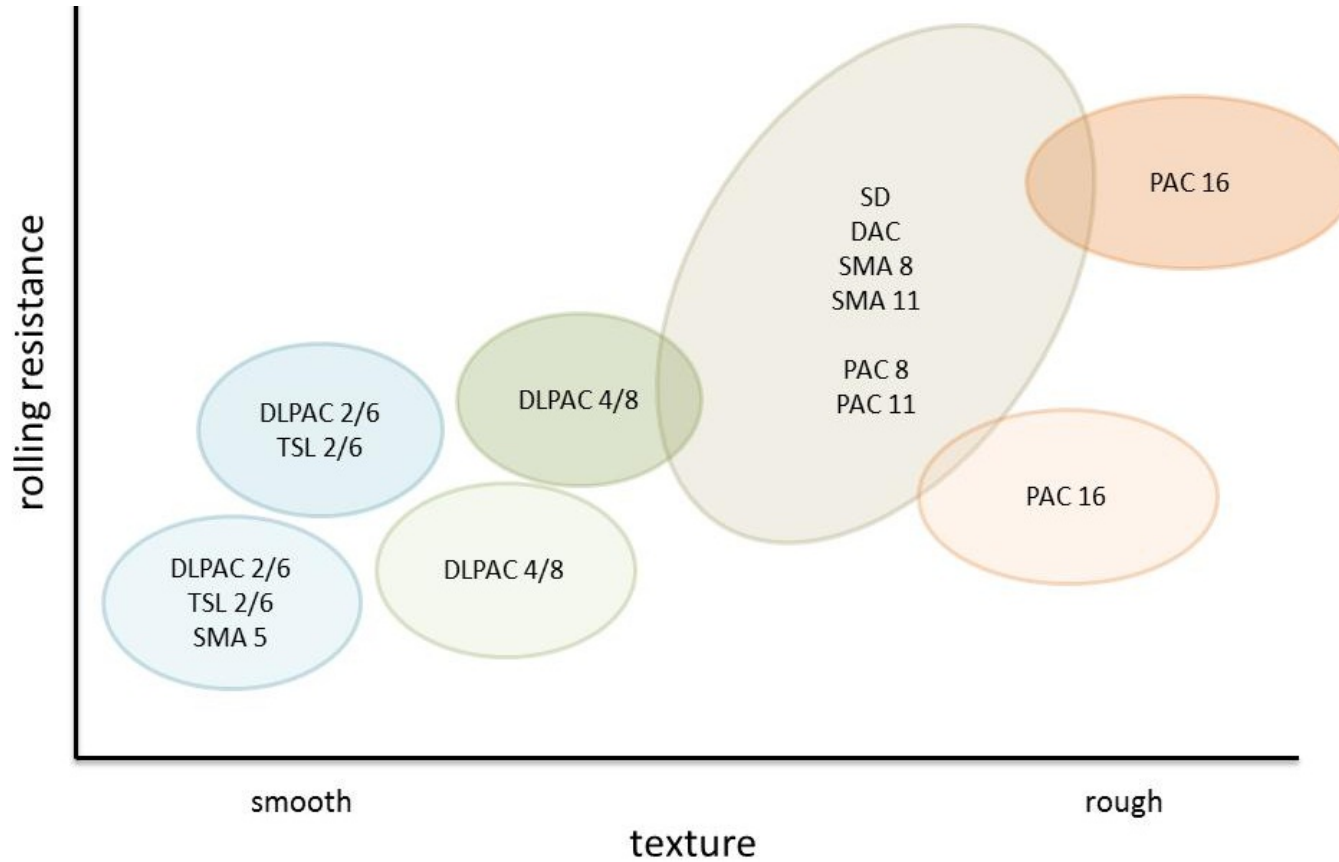
Texture: MPD, RMS and skewness



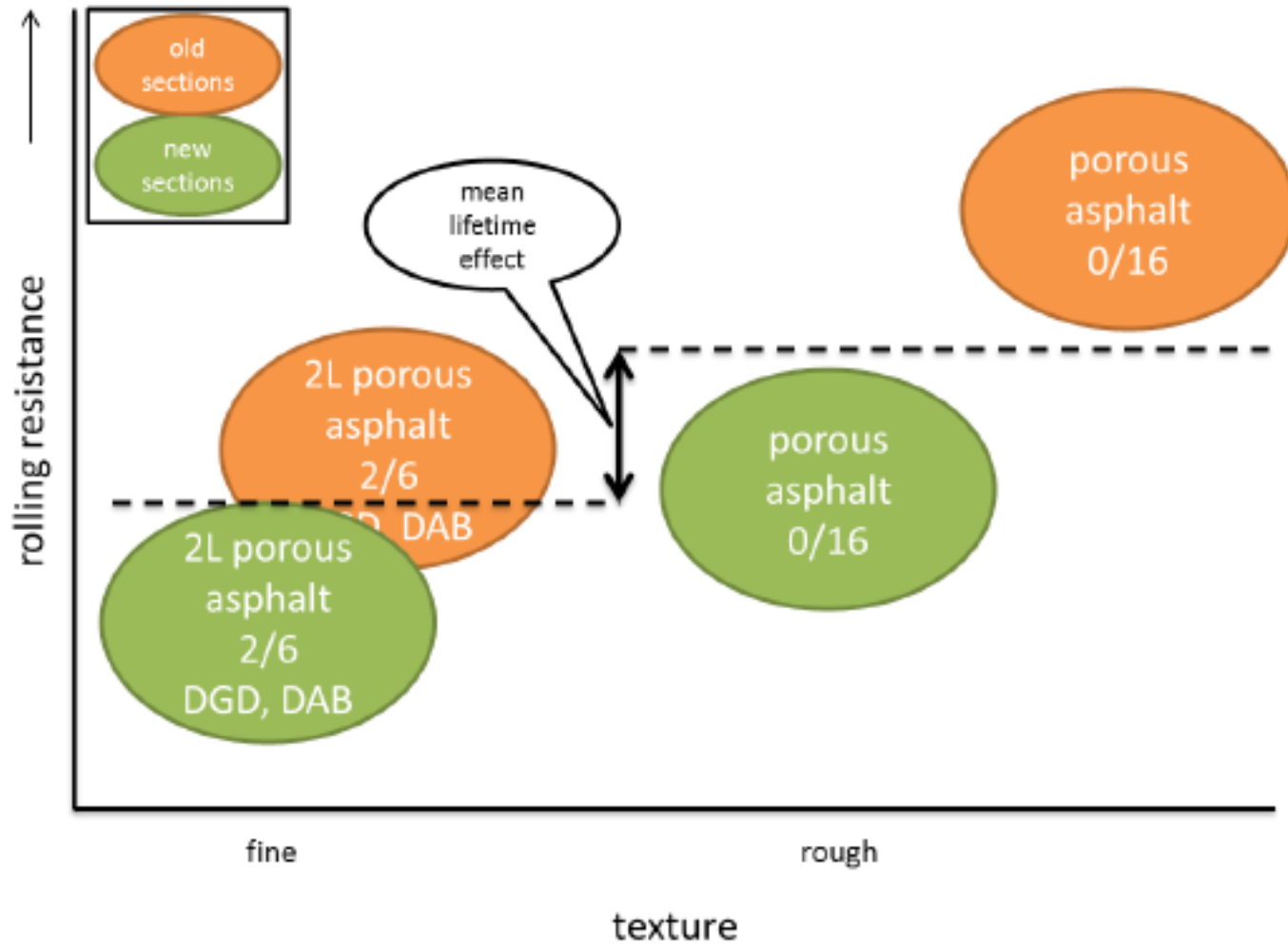
$$RRc = Const + X \cdot MPD + Y \cdot Rskew$$

$$(Rskew = MPD / RMS)$$

Expected spread due to surface type



Age-averaged RR difference for highways PAC 6/16 vs TLPAC 2/6



What can we learn from previous studies?

PAC 6/16 vs TLPAC 2/6

- IPG Round Robin Test
- 2004 - 2005
- difference 10%

but:

- older version trailer
- ... weather, age?

Round Robin Test
Rolling Resistance /
Energy Consumption



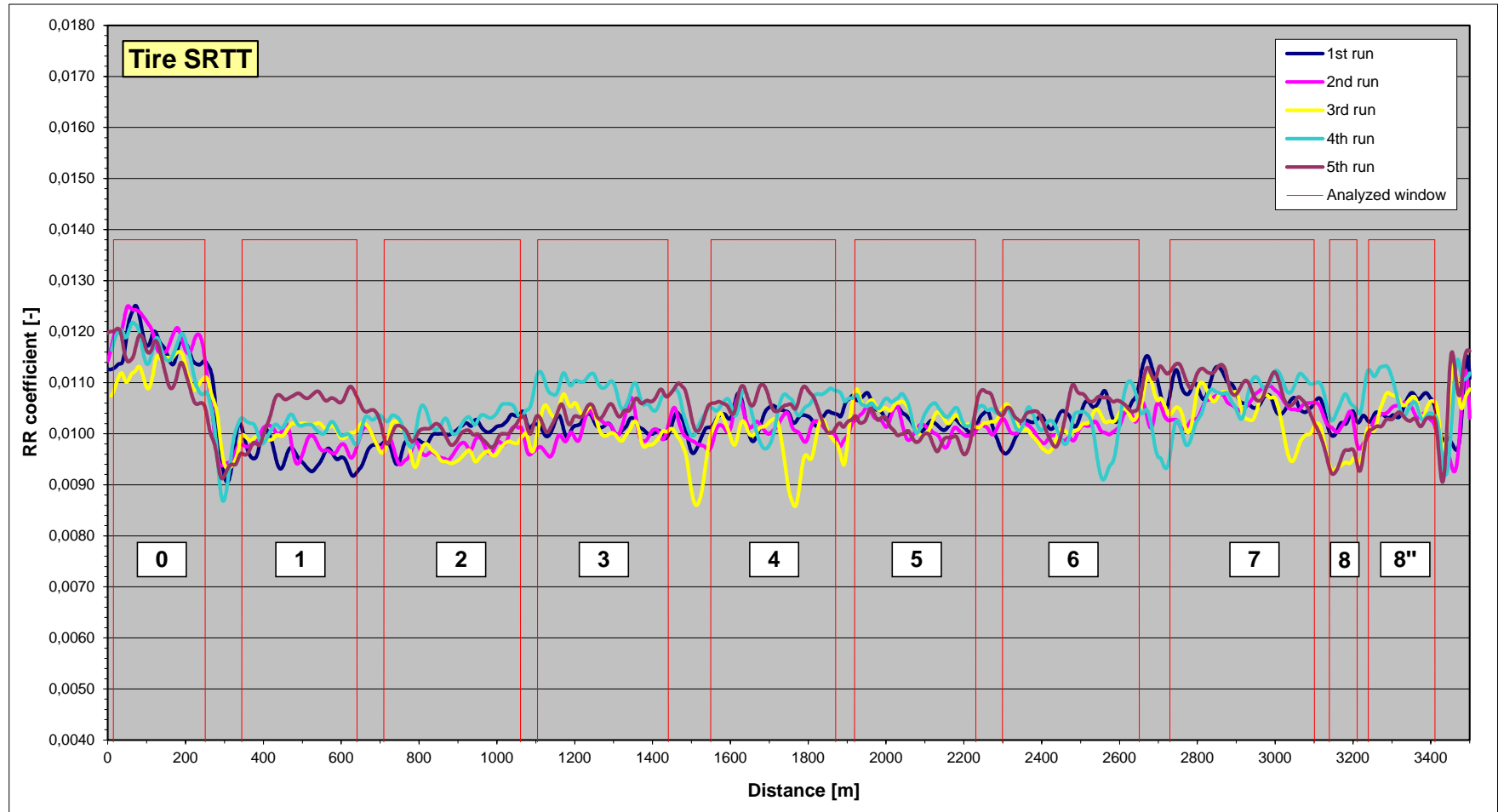
M+P.DWW.04.19.1

revision 6

May 31st 2005

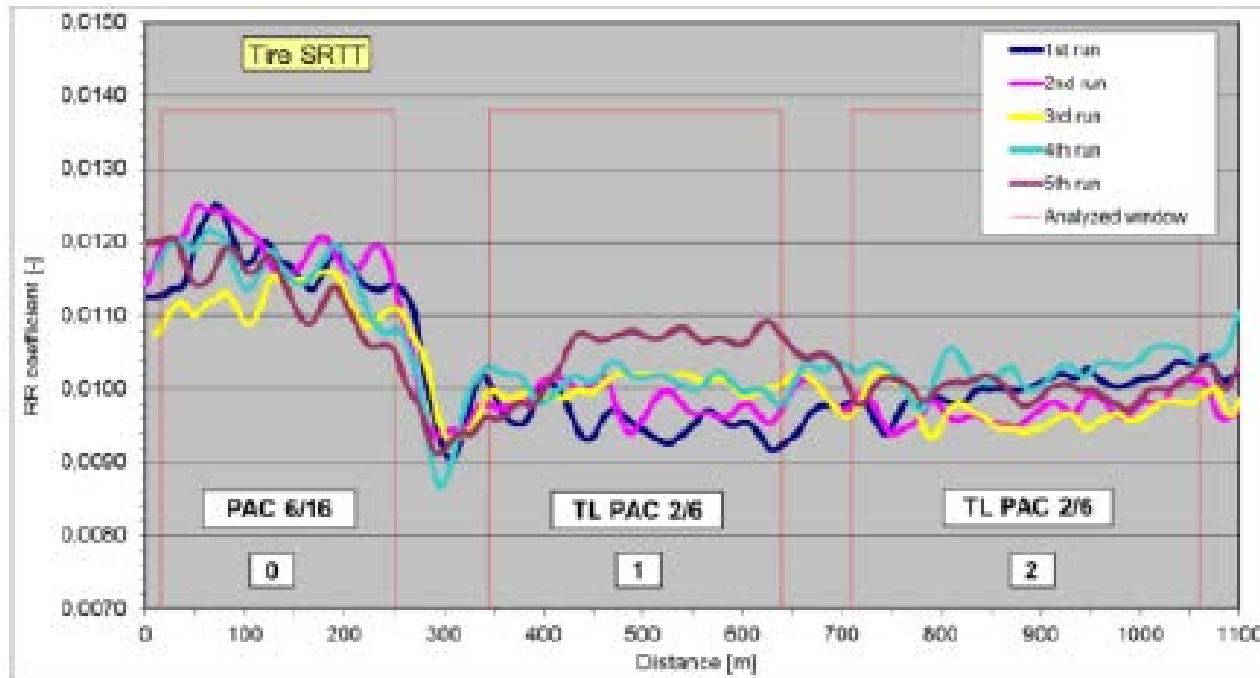
6400.2468

Highway A30 – 2008 – measurements TUG



RR difference: PAC 6/16 vs TLPAC 2/6

- A30
- measurements TU Gdansk
- difference: 17%
- but: new/old TLPAC vs new PAC

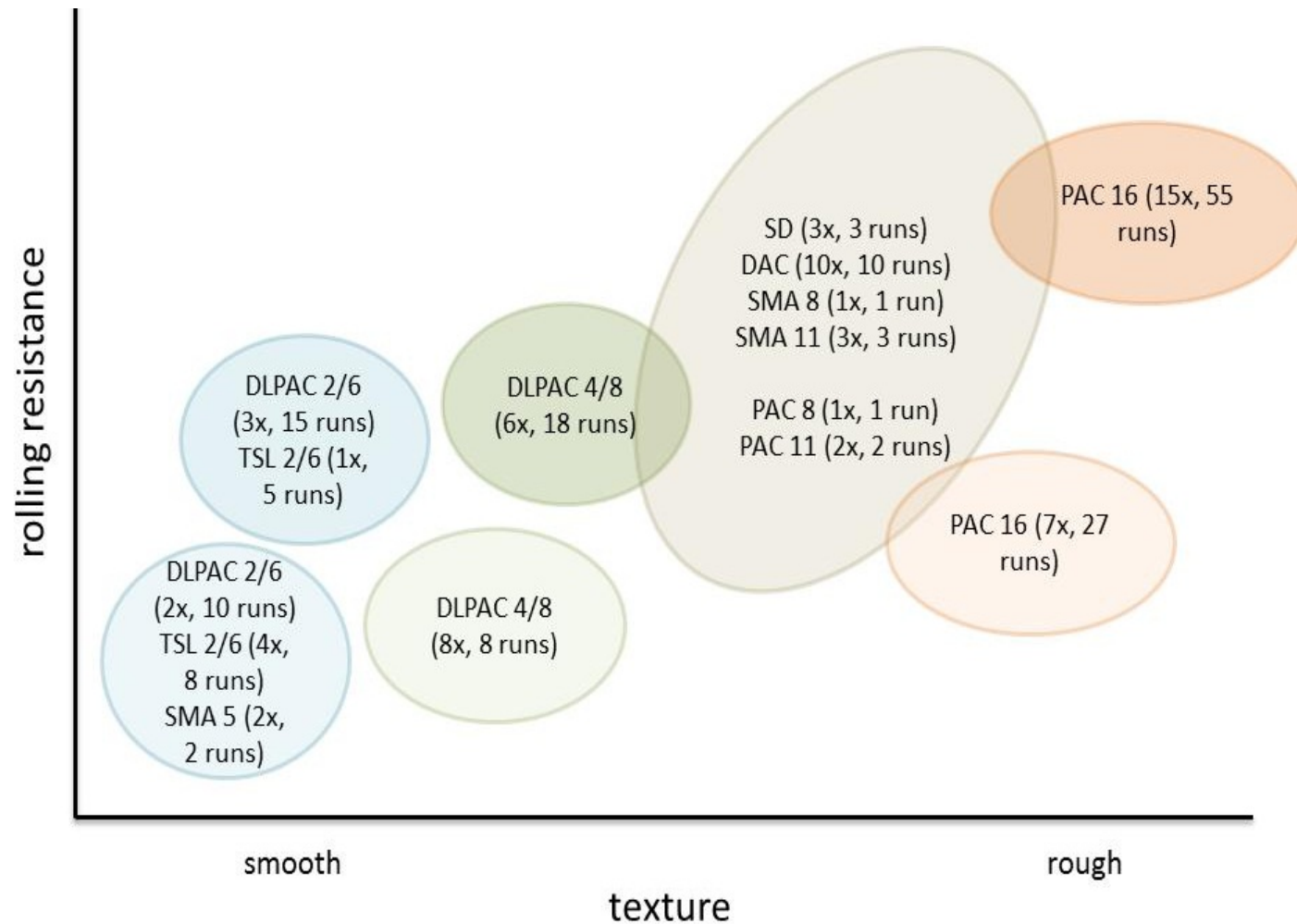


Measurement programme 2013

- start: March 2013
- 70 roads, 170 observation runs (RR, texture, T, tyre pressure)
- collaboration (Rijkswaterstaat, Province Gelderland)
- measurements by TU Gdansk and M+P



Measurement sections



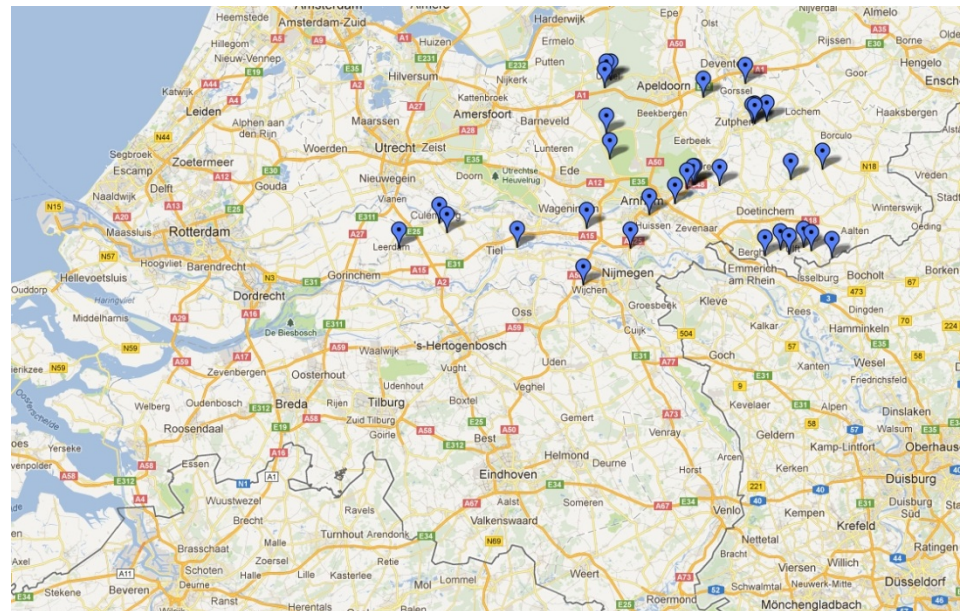


Measurement sections

- highways



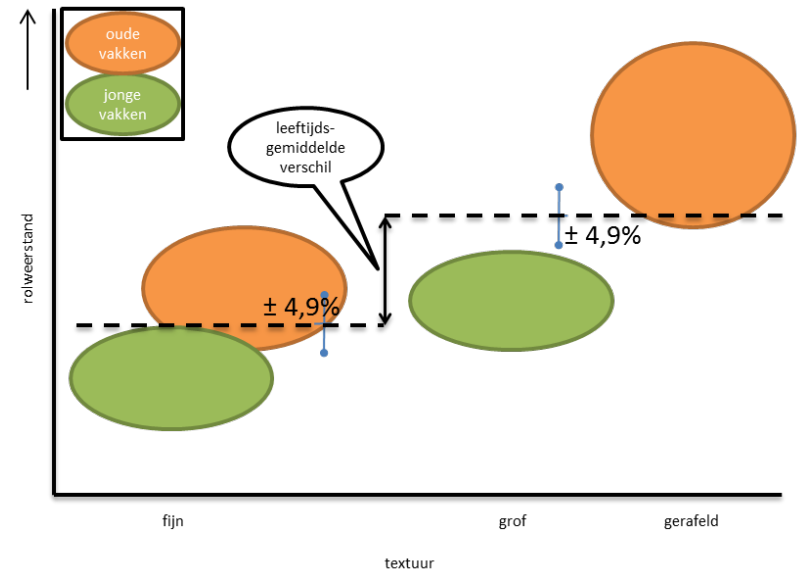
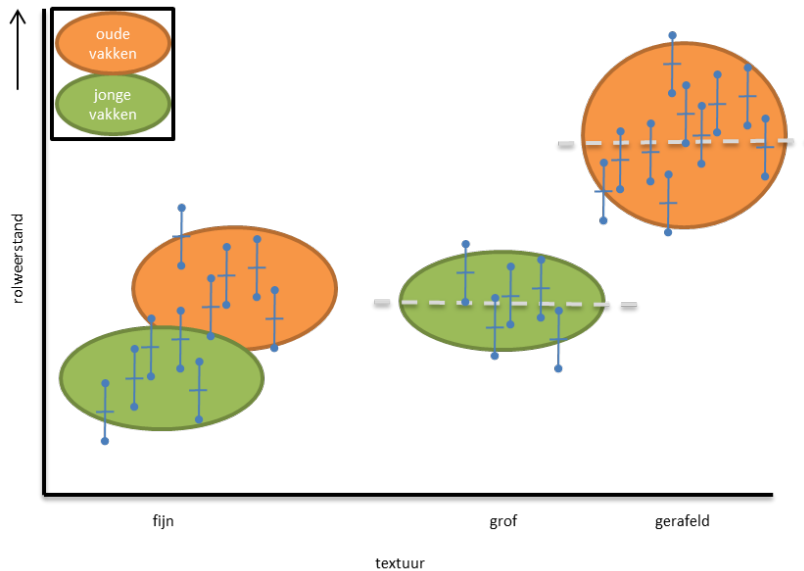
- regional roads



Current estimation

RR difference: PAC 6/16 vs TLPAC 2/6

- age averaged: 25%
- total measurement uncertainty $\pm 7\%$



Conclusions / summary

- the influence of the texture of the pavement on rolling resistance is important
- relevant parameters are stone size, skewness of the texture and the state of maintenance (ages, damage)
- measurements of rolling resistance and texture will be carried out on 70 different road sections of highways and regional ways
- special attention will be given to the accuracy of the measurements.
- we expect to find a significant difference between fine and rough textures, for cars about $25\% \pm 7\%$

Thank you for your attention

