USE OF PAVEMENT SURFACE TEXTURE CHARACTERISTICS MEASUREMENT RESULTS IN ESTONIA

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Introduction

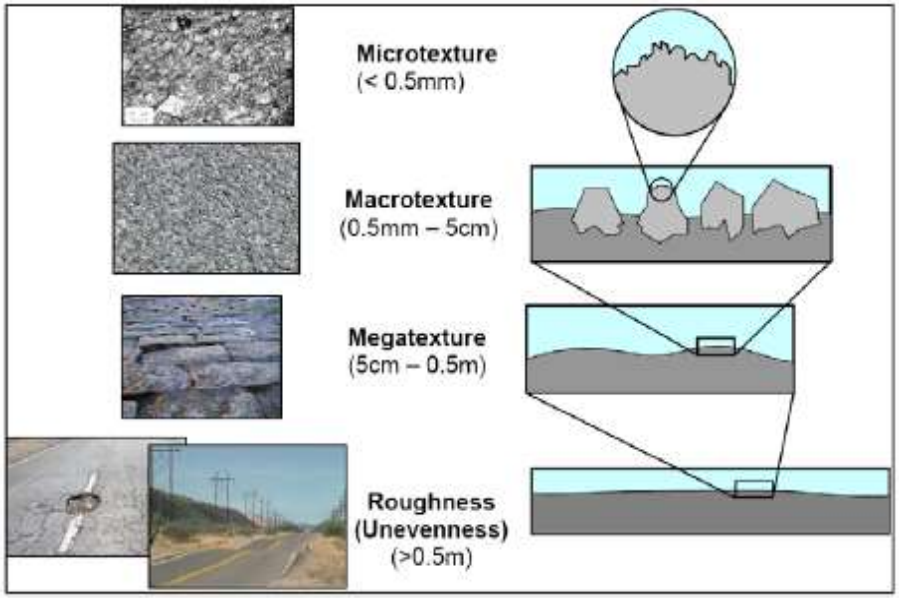
- Starting from 2011 Estonian Road Administration has decided to take into use a new parameter to describe pavement condition – pavement texture;
- Pavement texture is characterizing the condition of pavement surface and it has direct relationship with:
  - traffic safety (frictional properties),
  - driving comfort (noise, unevenness),
  - road user costs (fuel consumption), and
  - with construction quality (segregation, bleeding)

Objectives of the study

- to describe pavement texture characteristics and its parameters;
- to give an overview of international experiences using pavement texture values in decision process;
- to develop and present proposals for pavement texture parameter limits to be used in Estonia;
- to analyze pavement texture measurement results and to present conclusions on the results.

Pavement texture characteristics

Pavement texture is defined as the vertical unevenness of the absolutely even pavement surface. According to PIARC there are four wave length standard categories describing the pavement texture *(Rasmussen et al, 2011)*.



International experience

Nr.	Country	Texture measurements / Use of data in decision making	Texture parameters used in data analyses	Existence of limit values for texture parameters
1	Belgium	yes / in the stadium of research	MPD	under development
2	Lithuania	yes / no	MPD?	no
3	Slovenia	yes / yes	SMTD	yes
4	Norway	yes / in the stadium of research	-	under development
5	France	yes / yes	MPD	yes
6	Great Brittan	yes / yes	SMTD	yes
7	Italy	yes / yes	MPD and SH (also TL, PSD)	partly yes, partly under development
8	Latvia	yes / no	MPD	no
9	Finland	yes / in the stadium of research	RMS	under development
10	Denmark	yes / yes	MPD	yes
11	Sweden	yes / in the stadium of research	MPD (earlier RMS)	partly yes, partly under development
12	Australia	yes / yes	MPD (depending from district)	partly yes, partly under development
13	Estonia	yes / in the stadium of research	MPD and RMS	under development

Pavement texture limit values

Proposed pavement macrotexture MPD limit values for Estonia are dependant from the maximum allowed traffic speed and traffic volume.

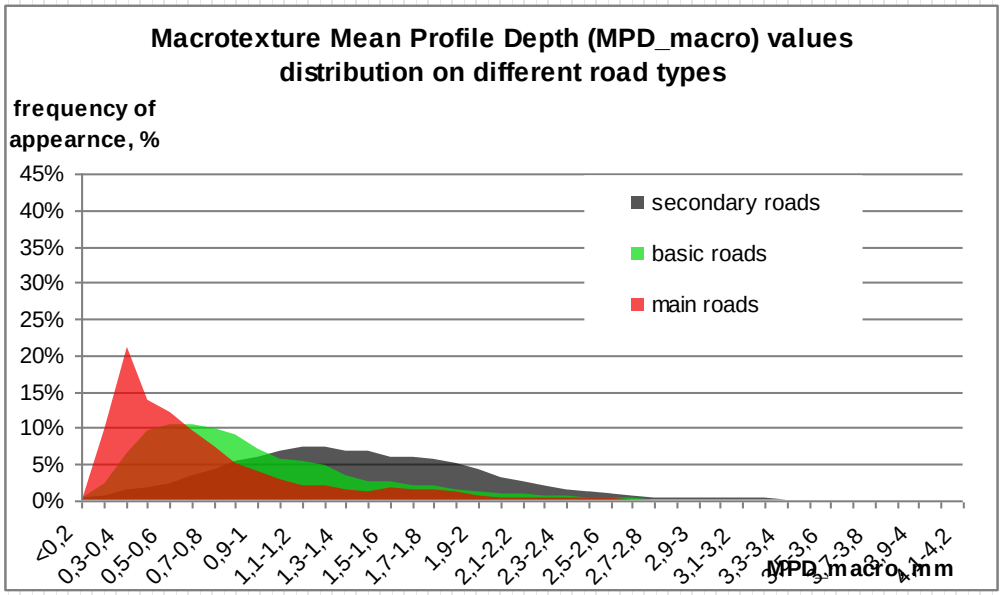
AADT, vehicles/24h	Maximum allowed traffic speed, km/h			
	110	90	70	50
< 500	≥0.40	≥0.35	≥0.30	≥0.25
500 – 1000				
1000 – 5000				
> 5000				

Pavement megatexture RMS limit value for Estonia is proposed ≤ 0.9

Pavement texture analysis

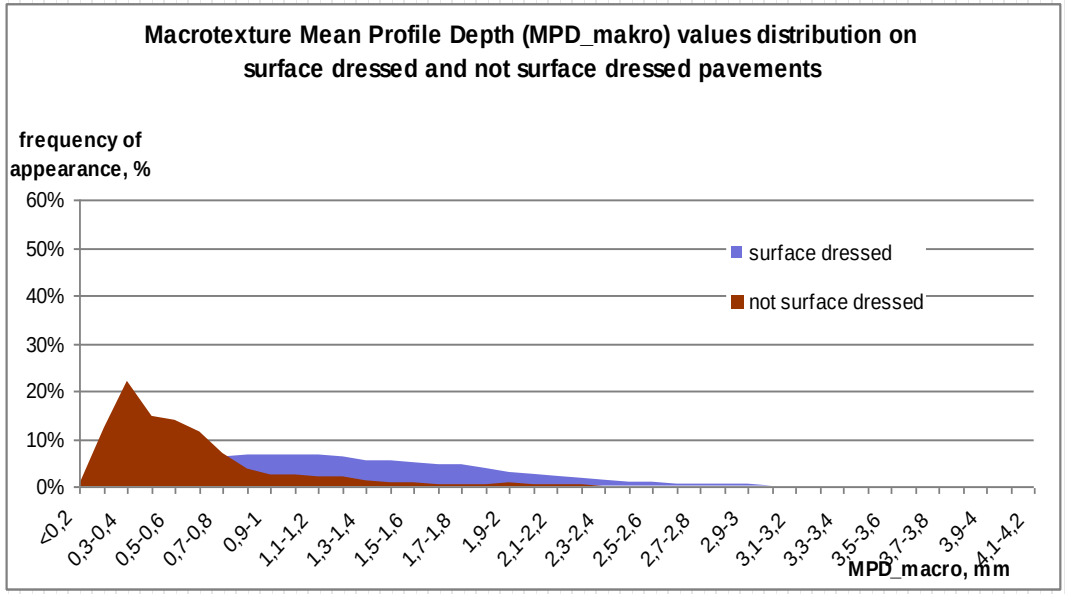
- Pavement texture values of different road types;
- Pavement texture values of different pavement types;
- Change of pavement texture values during pavement service life
  - Pavements without surface dressing
  - Pavements with surface dressing
  - Pavements with different surface dressing materials
- Pavement texture and traffic accidents.

Texture values on different road types



Lower macrotexture values were observed on main roads pavement, higher values were observed on secondary road pavement. Medium values are characteristic for basic roads. Similar distribution could be noted for megatexture values.

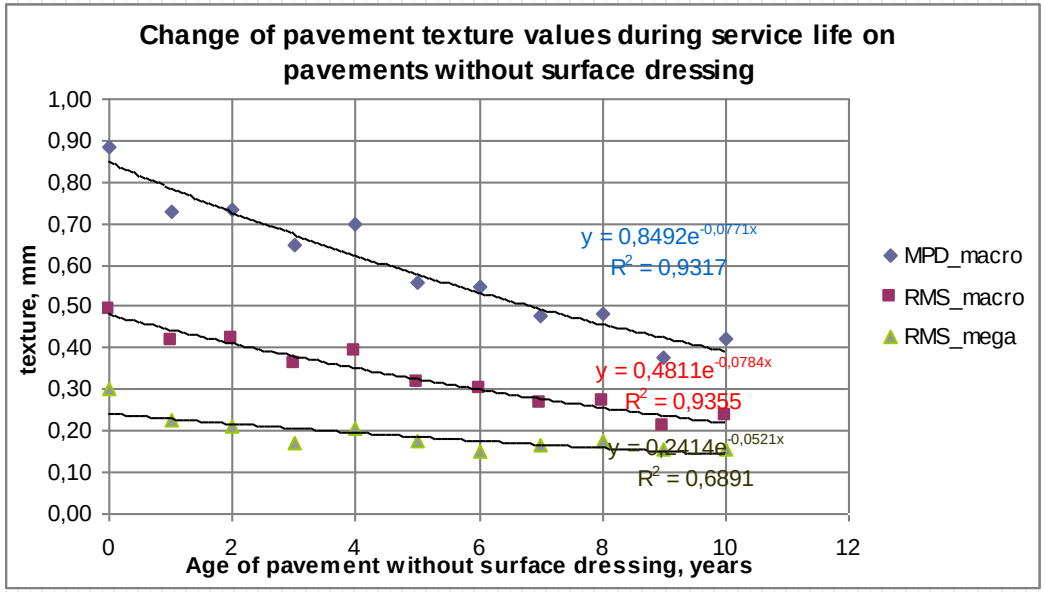
Texture values of different pavement types



Both macro- and megatexture values are higher on surface dressed pavements.
Partial overlapping of results can be explained with materials used, pavement age, material wearing, etc.

Development of texture values during pavement service life (1)

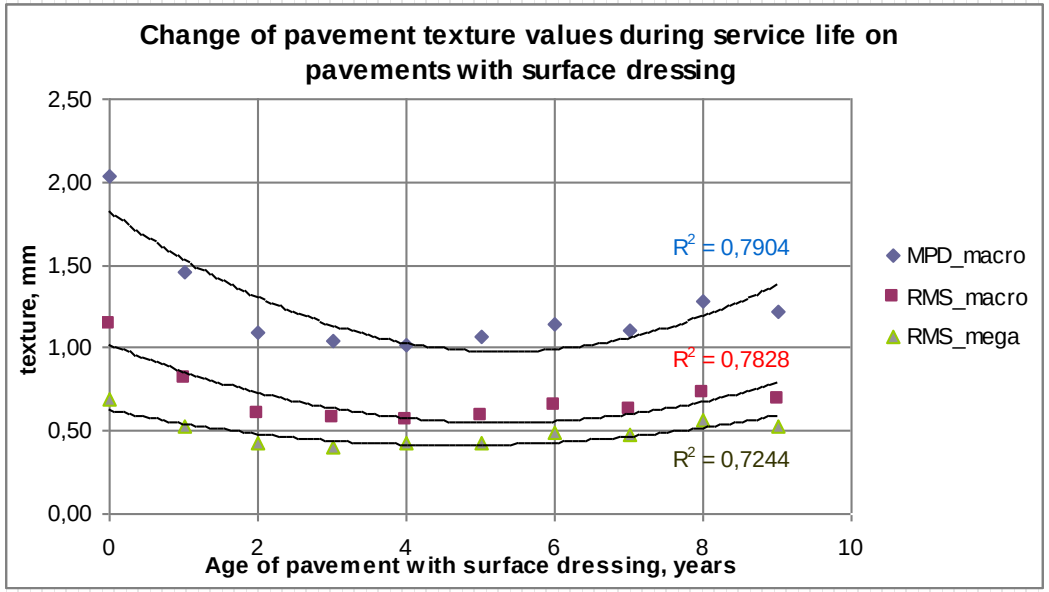
Pavements without surface dressing



The change of macro- and megatexture values by time has a good relationship.
During the pavement service life macrotexture values are decreasing faster than megatexture values.

Development of texture values during pavement service life (2)

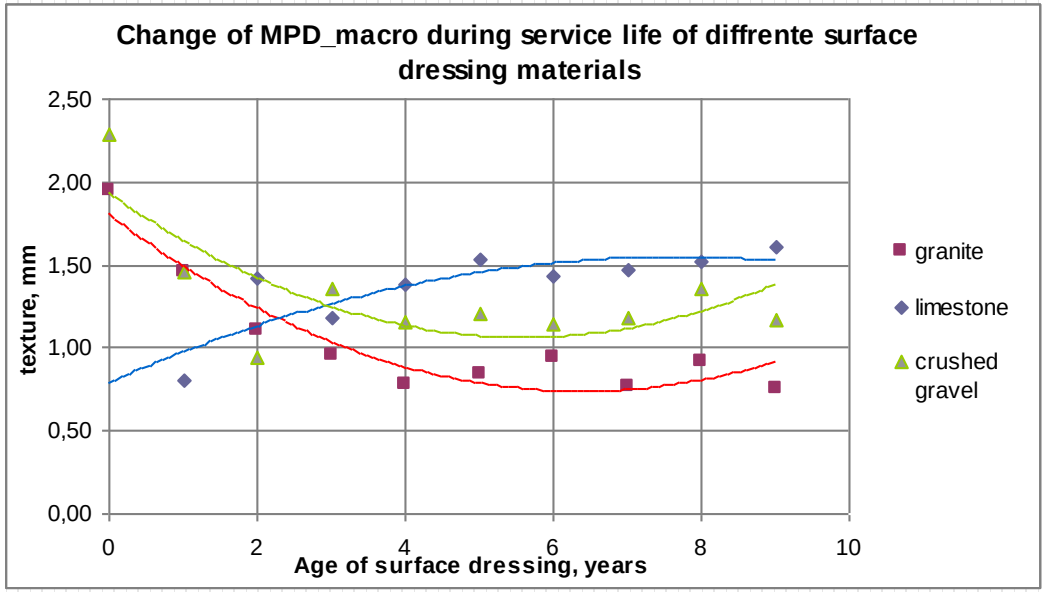
Pavements with surface dressing



The change of macrotexture during the first two service years is quite intensive. After that texture values are stabilizing for some years and at the age 5-6 years surface dressed pavement texture values are starting to increase.

Development of texture values during pavement service life (3)

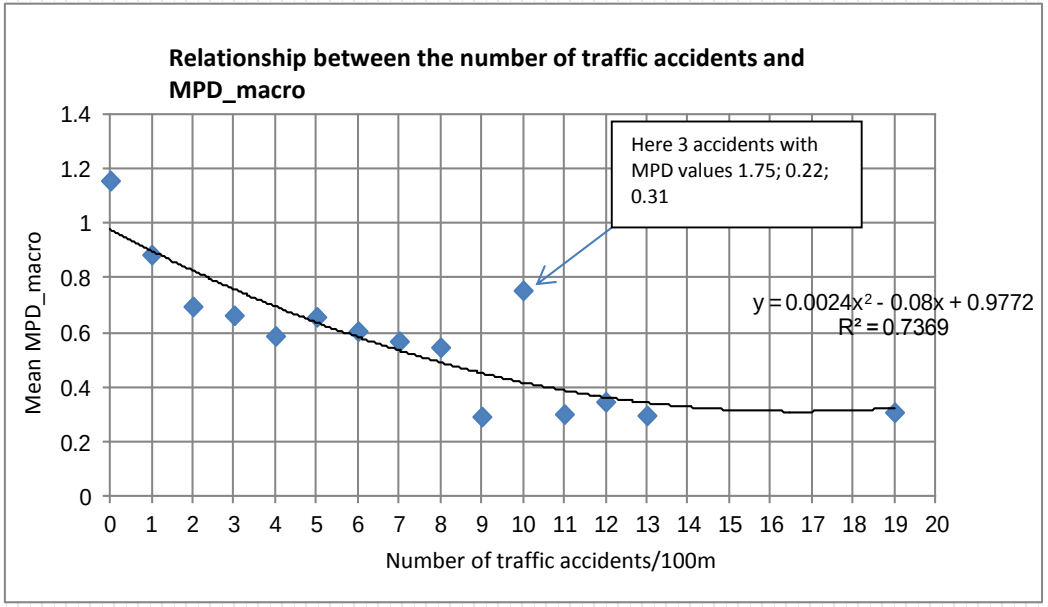
Pavements with different surface dressing materials



Pavements, surface dressed with granite and graded crushed gravel, are behaving similarly – texture values are decreasing during the service life.

Texture values of pavements, surface dressed with limestone, are increasing during the service life.

Pavement texture and traffic accidents



Traffic accident data form past 10 years was compared with pavement texture values. With the decrease of pavement macrotexture values the probability of traffic accident is clearly increasing.

Conclusions

- Pavement macrotexture MPD limit values, depending from AADT and speed limits, are proposed to be used in Estonia;
- Megatexture RMS limit value ≤0.9 mm is suggested to be used in Estonia;
- Higher macrotexture values are characteristic for secondary roads, medium values for basic roads and smaller values for main roads;
- Macrotexture MPD values and megatexture RMS values are higher on surface dressed pavements;
- With the decrease of pavement macrotexture values the probability of traffic accident risk is increasing.

The use of texture values in Estonia

- Macrotexture can be used for evaluation of pavement traffic safety and frictional properties;
- Megatexture can be used as the pavement property parameter that has to be avoided – road sections with high megatexture values have to be added to the repair list;
- Macro- and megatexture values can be used for selection of appropriate surface dressing materials;
- Macro- and megatexture values can be used as quality criteria, based on what the quality of the new pavement or surface dressing can be assessed.

Thank you for your attention!

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