INFLUENCE OF THE GRITTING MATERIAL ON THE PAVEMENT PERFORMANCE

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0. CONTENT

1. INTRODUCTION

During the winter months, the weather-related decrease in road skid resistance affects traffic safety.

► this is not acceptable

Therefore, various gritting materials are widely applied during the winter services

- to thaw ice and snow on the road surface or
- to keep the traffic safety by lowering the slipperiness (increasing the skid resistance)

1. INTRODUCTION

After the proper use, the gritting material remains on the road surface:

- The material will act as a kind of polishing agent in the tyre-road contact area and will magnify the polishing effect on the surface
- This leads to a structural change in the aggregates and bitumen film, which changes the micro and the macro texture of the surface

► It has to be investigated if the gritting materials exert an influence on the surface performance

2. EXPERIMENTAL PROGRAM

Key issues of investigation :

- Influence of the gritting material as polishing agent on the development of skid resistance
  - composition
  - grain size and
  - formation of the gritting material
- Influence of water on the development of skid resistance

2. EXPERIMENTAL PROGRAM

Step 1:

Step 2:

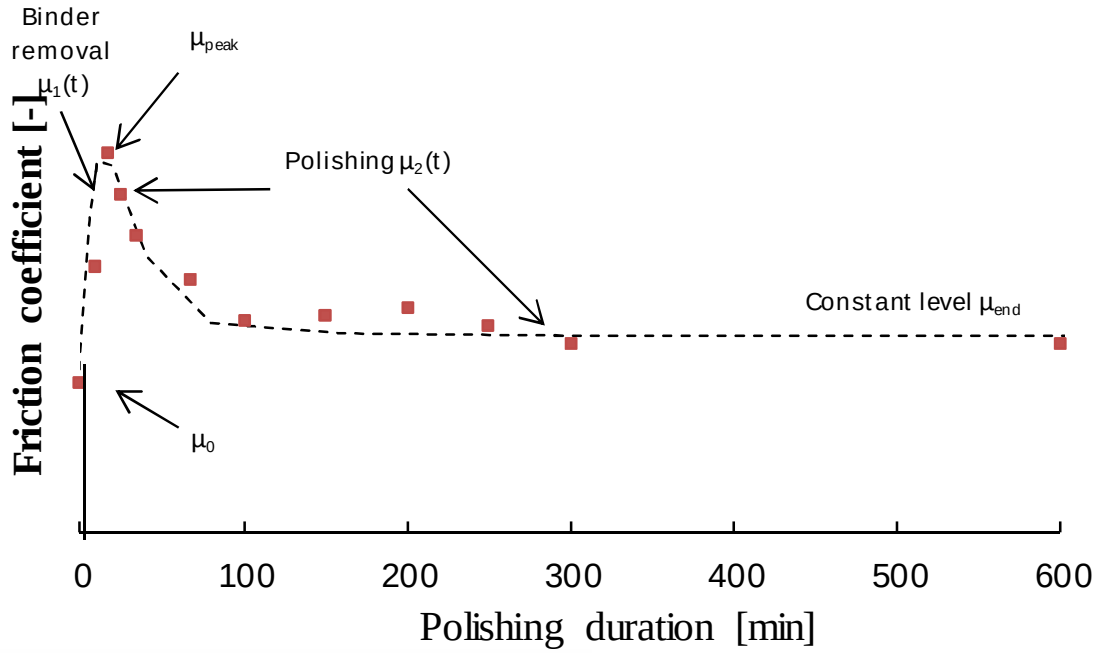
Step 3:

- Test plates were taken from the test track and polished using the Aachen Polishing Machine (APM).
- The friction coefficient can be determined with the Wehner/Schulze (W/S) machine corresponding to a velocity of 60 km/h.

2. EXPERIMENTAL PROGRAM

Influences of the different polishing conditions can be demonstrated by the parameters of the skid resistance development:

- removal of the binder
- maximum (μ_{peak})
- constant level (μ_{end})



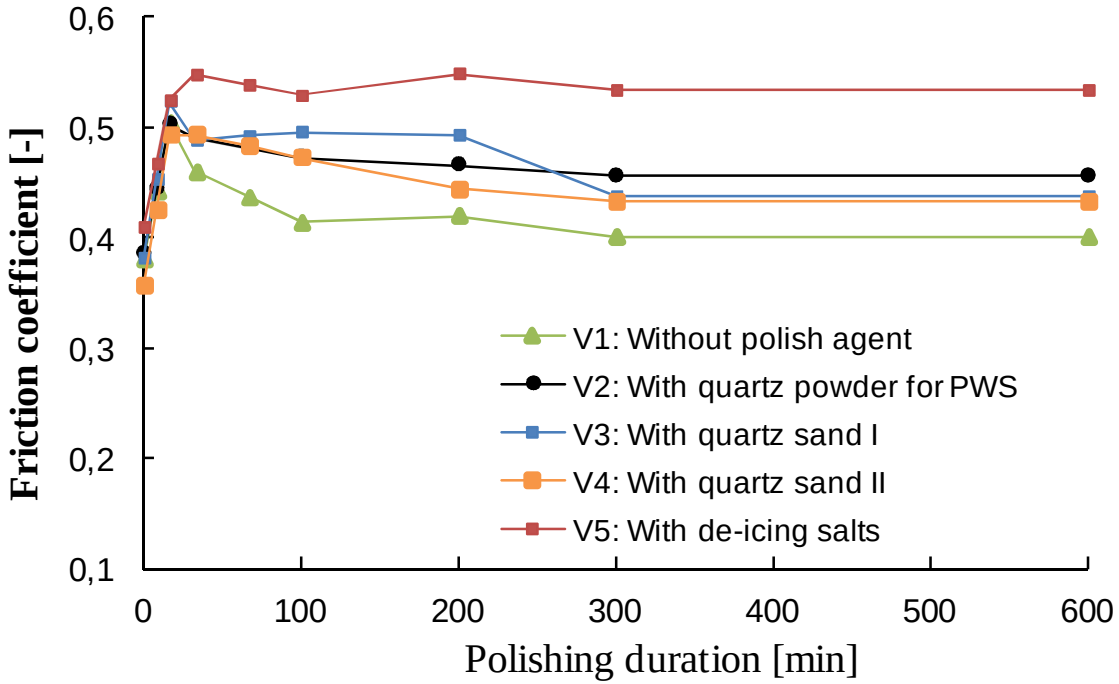
3. RESULTS AND DISCUSSION

3.1 Influence of the polishing agent on the skid resistance development

Investigation variants:

- (V 1) without polishing agent and with water
- (V 2) with quartz powder for PWS and water
- (V 3) with quartz sand I and water
- (V 4) with quartz sand II and water
- (V 5) with de-icing salt and water

3.1. Influence of the polishing agent on skid resistance development



Variant	$\bar{\mu}_0$ [-]	t_{peak} [min]	μ_{peak} [-]	μ_{end} [-]
V1	0.387	13.9	0.503	0.406
V2 (quartz powder)	0.370	8.02	0.504	0.456
V3 (sand I)	0.369	7.53	0.514	0.437
V4 (sand II)	0.378	23.6	0.498	0.432
V5 (de-icing salt)	0.396	38.6	0.587	0.536

3.1. Influence of the polishing agent on skid resistance development

Results:

➢Asphalt plates have different skid resistance development curves under different polishing conditions:

- the removal speed of the bitumen
- the maxima of the skid resistance (μ_{peak}) are also different
- the values of μ_{end} are in the order:

$$\mu_{end,\,V5} > \mu_{end,\,V2} > \mu_{end,\,V3} \approx \mu_{end,\,V4} > \mu_{end,\,V1}$$

➢With de-icing salt (V5), the final skid resistance is the highest.

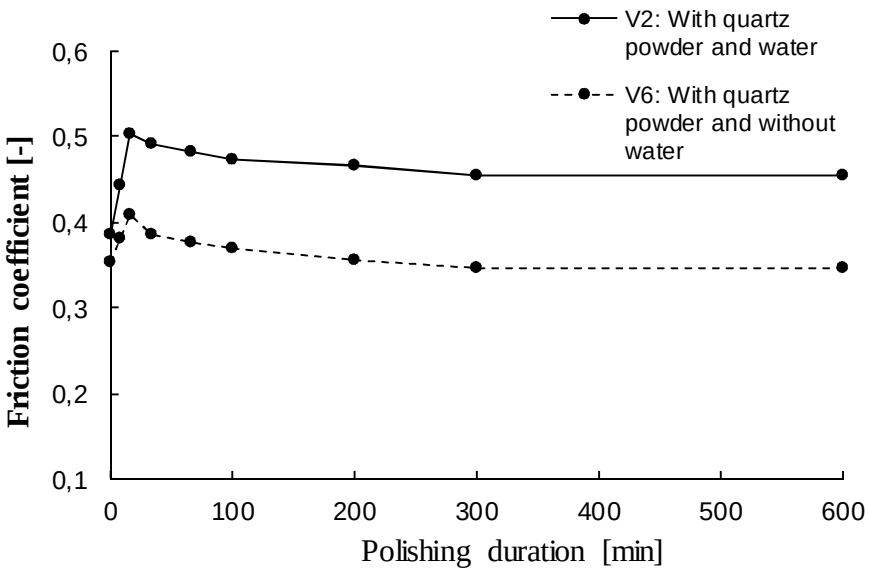
3. RESULTS AND DISCUSSION

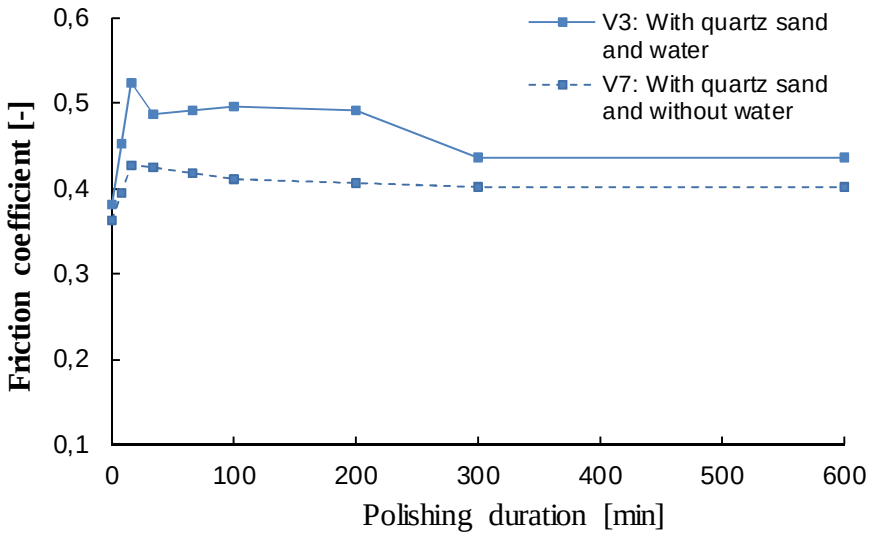
3.2 Influence of water on the development of skid resistance

Investigation variants:

- (V 2) with quartz powder for PWS and water
- (V 3) with quartz sand I and water
- (V6) With quartz powder and without water
- (V7) With quartz sand and without water

3.2 Influence of water on the skid resistance development



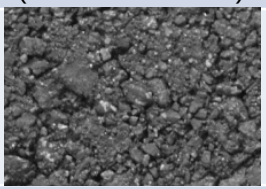
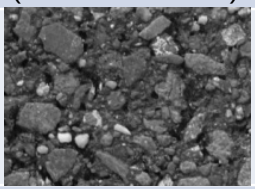
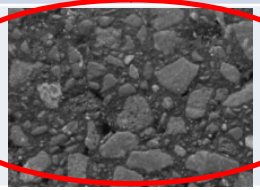


Variant	$\bar{\mu}_0$ [-]	t_{peak} [min]	μ_{peak} [-]	μ_{end} [-]
V2 (quartz powder + water	0,370	8,017	0,504	0,456
V3 (quartz sand + water)	0,369	7,529	0,514	0,437
V6 (quartz powder)	0,344	2,749	0,412	0,347
V7 (quartz sand)	0,359	17,439	0,427	0,402

3.2 Influence of water on the skid resistance development

Results:

- The plates polished under the addition of water show higher friction values than those polished without water.
- Without water, the polishing agent blends with the rubber abrasion and sticks to the bitumen. A thin, slight deposition is formed on the surface, so that the macro-texture depth (MTD) is reduced.

	with quartz powder	with quartz sand
With water	(MTD = 0.43 mm) 	(MTD = 0.74 mm) 
Without water	(MTD = 0.35 mm) 	(MTD = 0.48 mm) 

4. CONCLUSIONS

- The remaining de-icing agent from the winter maintenance acts as a polishing medium and exerts a great effect on the skid resistance of road surfaces.

- With de-icing agents (quartz powder or sand), all aggregate grains on the surface are strongly polished.

- De-icing salt only affects the bitumen film, while the aggregates are only minimally polished. This leads to the highest skid resistance.
  - ➢ Applying de-icing salt is the best option for winter services on roads

Thank you for attention

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