



# *What did the asphalt industry achieve in 40 years and what is next?*

*Egbert Beuving*

**EAPA**

# *Introduction*

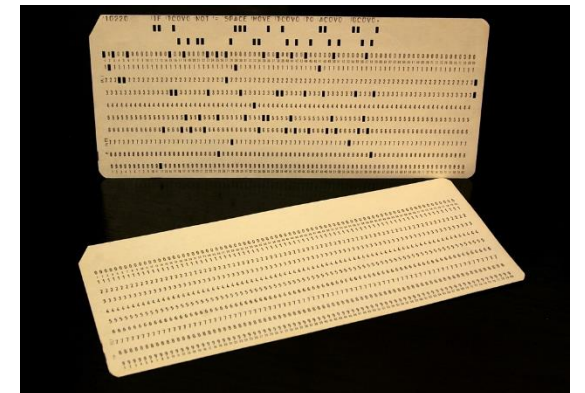
What happened or changed in the last 40 years in the asphalt industry regarding

- Digitalisation
- Asphalt Mixtures
- Bitumen
- Rolling resistance
- Asphalt Paving and Compaction

# Digitalisation

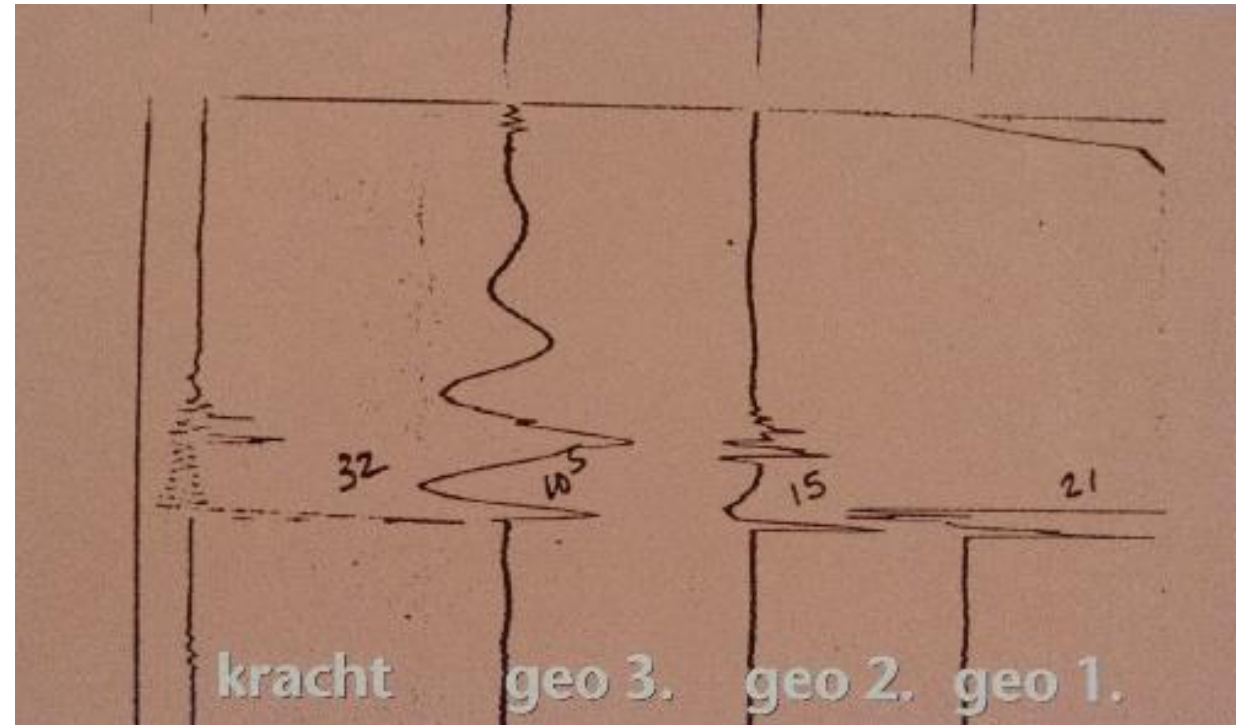
40 years ago:

- No PC's, no laptops, no tablets, no mobile phones, no internet
- Modem speed 300 bps
- Limited access to information
- Information sources: Magazines and congresses & congress proceedings
- Databases interesting for road construction: RSWB, ICONDA and IRRD





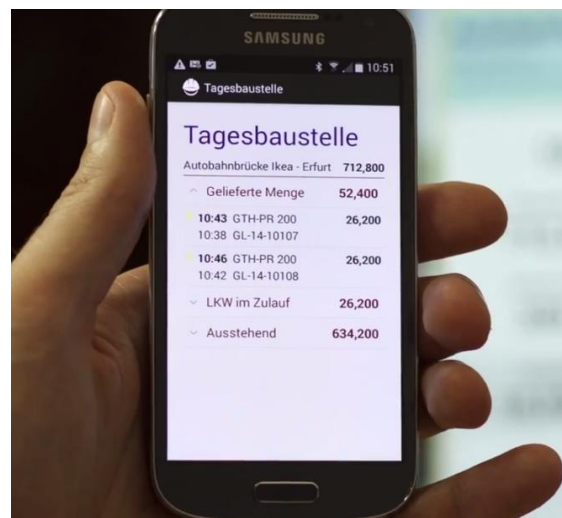
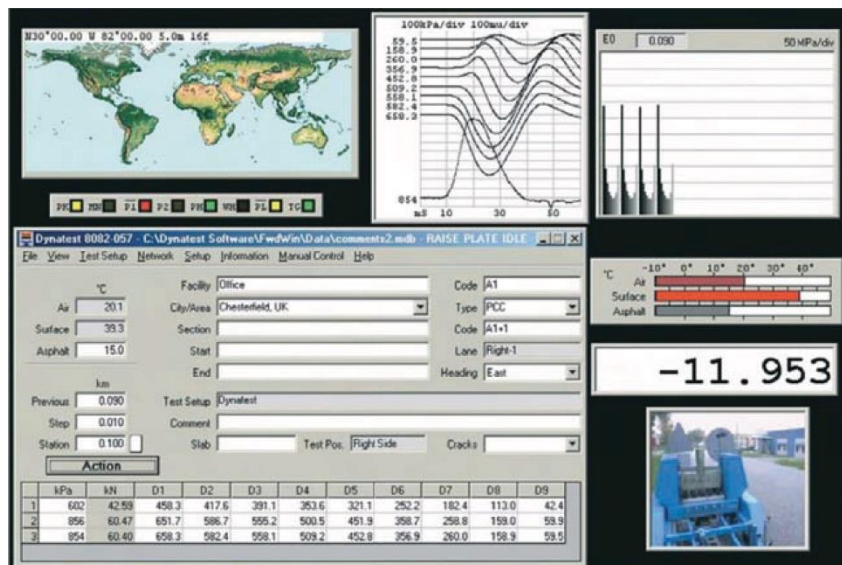
# *Pre-digitalisation*



Recorded analogue signal on UV paper

1979

# Now





# *Asphalt mixtures*

In 1980

- Asphalt Concrete
- Mastic Asphalt

and

- Marshall stability
- Marshall flow



# *Additional Functional Requirements*

Next to Rutting Resistant, Fatigue / Cracking Resistant, Low Temp. Resistant now also

- Splash & Spray Reduction
- Noise Reduction
- Lower Carbon Footprint
- Better Durability
- Lower Rolling Resistance
- Higher recycling rate
- ...





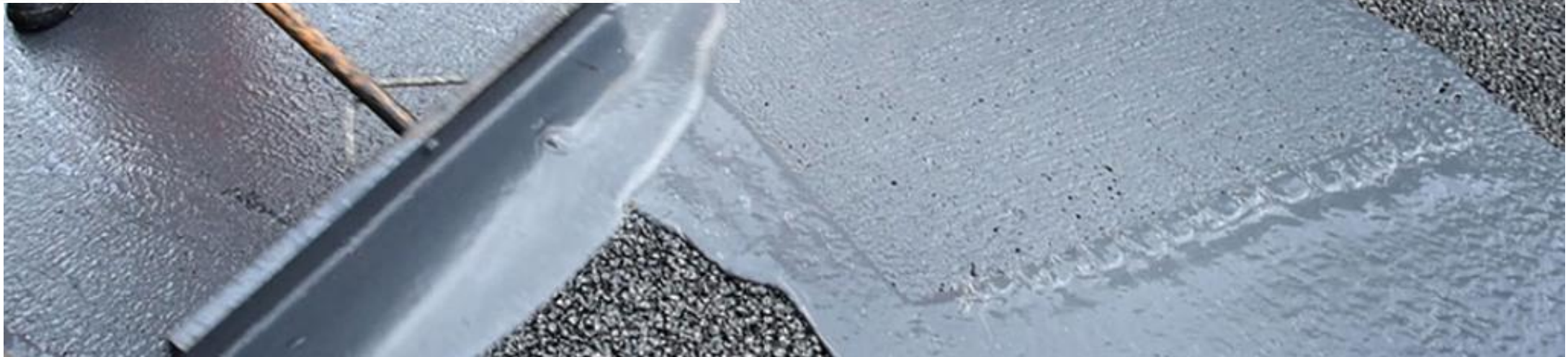
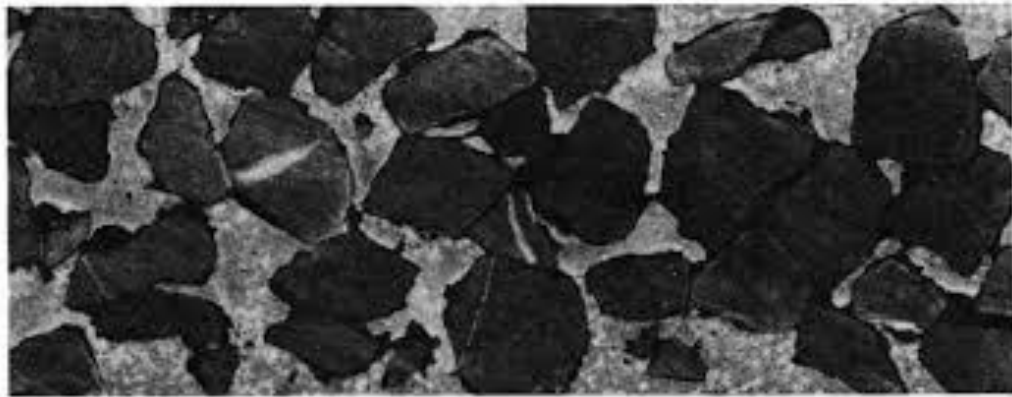
# *Porous Asphalt*



PA – 1<sup>st</sup> generation  
PA – 2<sup>nd</sup> generation  
PA – 3<sup>rd</sup> generation (OPA 8)

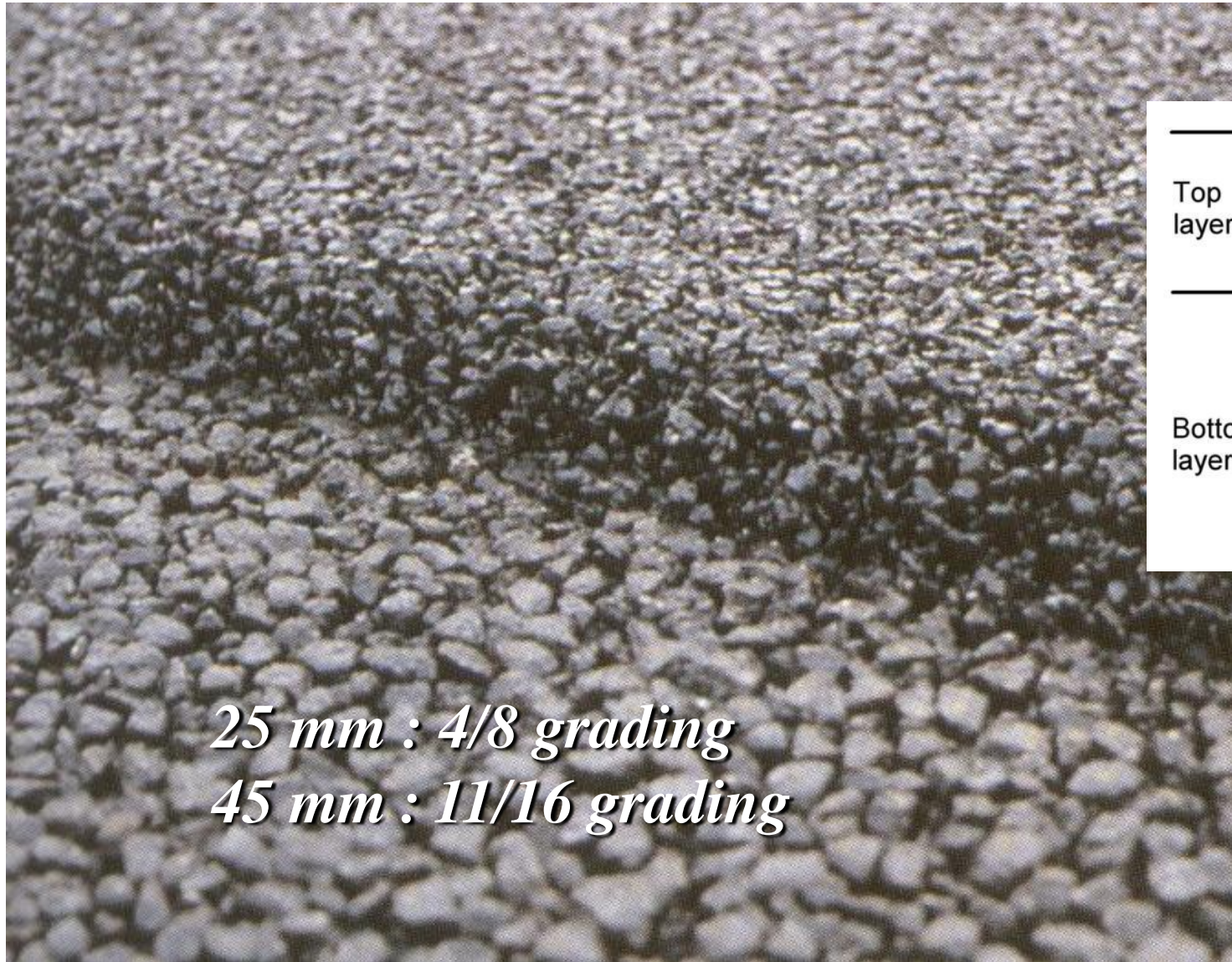


# *Grouted Macadam*





# *Doubled Layered Porous Asphalt*



*25 mm : 4/8 grading*  
*45 mm : 11/16 grading*

Top  
layer

Bottom  
layer

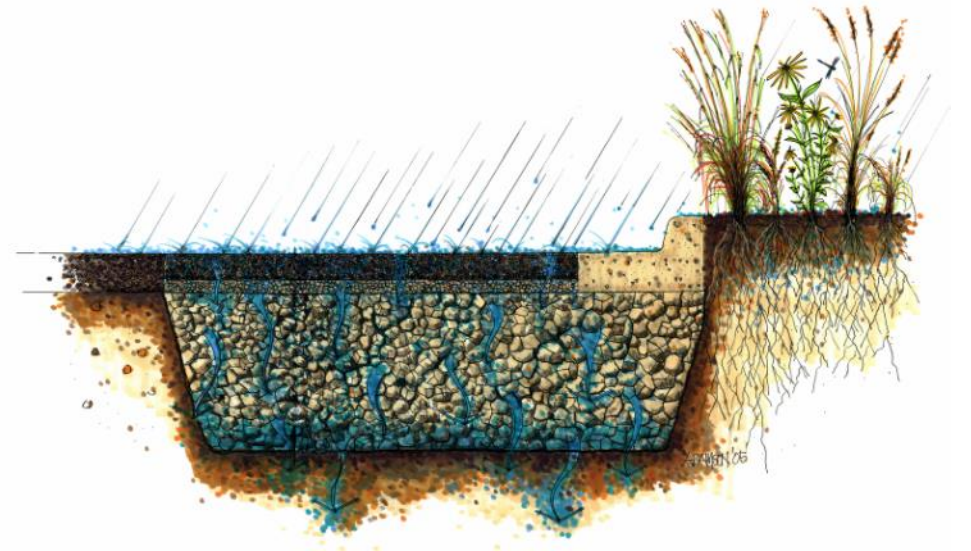




# *Porous Pavements*



The rain goes directly into the groundwater



# SMA



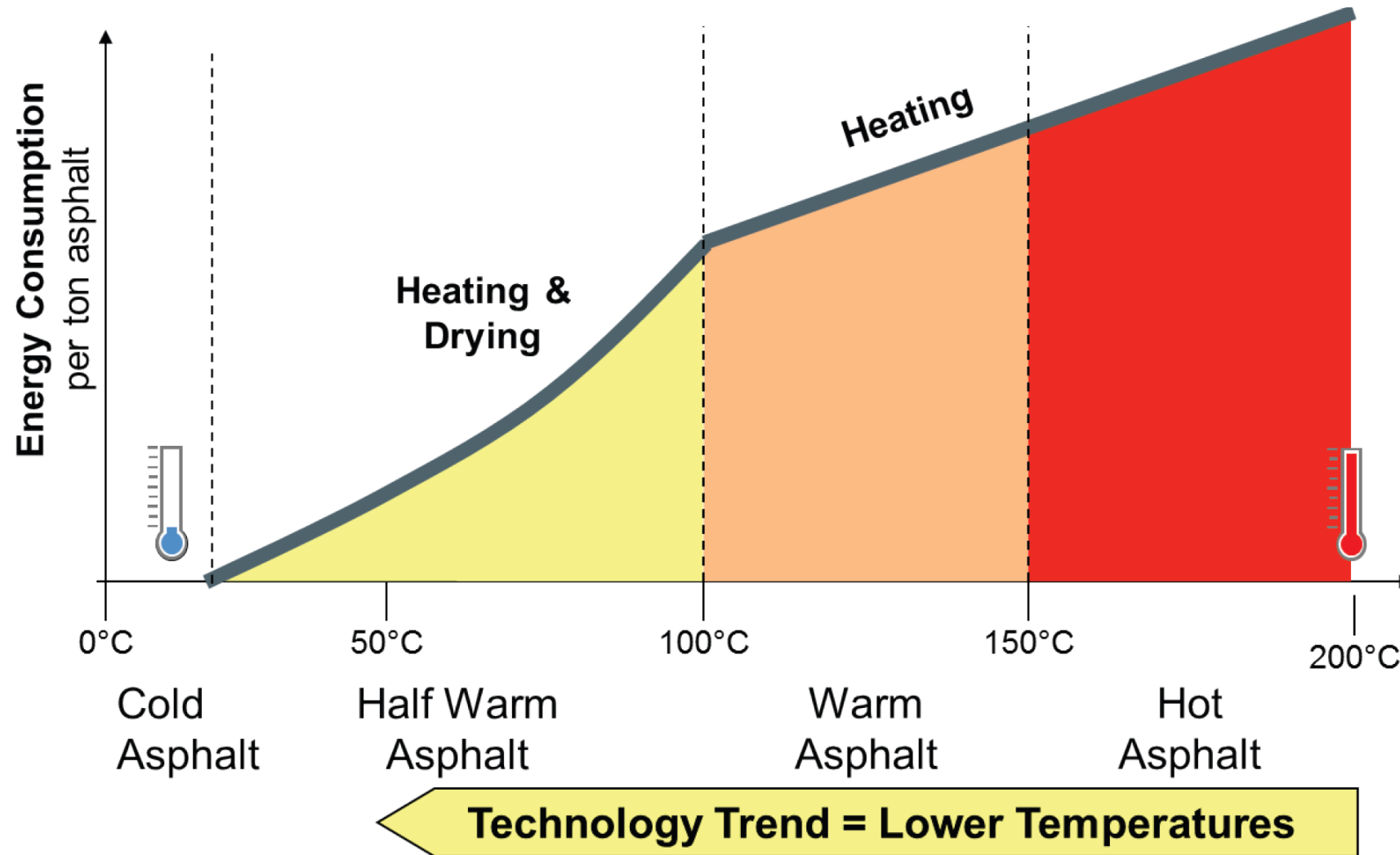
- SMA
- SMA Low Noise
- SMA Low Rolling Resistance



# *Ultra-thin Layers*



# Warm Mix Asphalt





# *Compact asphalt*



... and

- Rich Bottom Approach
- Low Temperature Asphalt
- Porous Mastic Asphalt
- RollPave
- Long Life (Perpetual) Pavements
- ...

## European Bitumen Specifications

- **1st generation:** harmonization of national existing standards
  - 1990–2000 for paving grades => Standard EN12591
  - Based on conventional test methods
  - To be revised in 2005
- **2nd generation:** development of performance related standards
  - Project started in 2000, in progress
- Under responsibility of **CEN TC 336 Bituminous Binders**



TRB January 2005



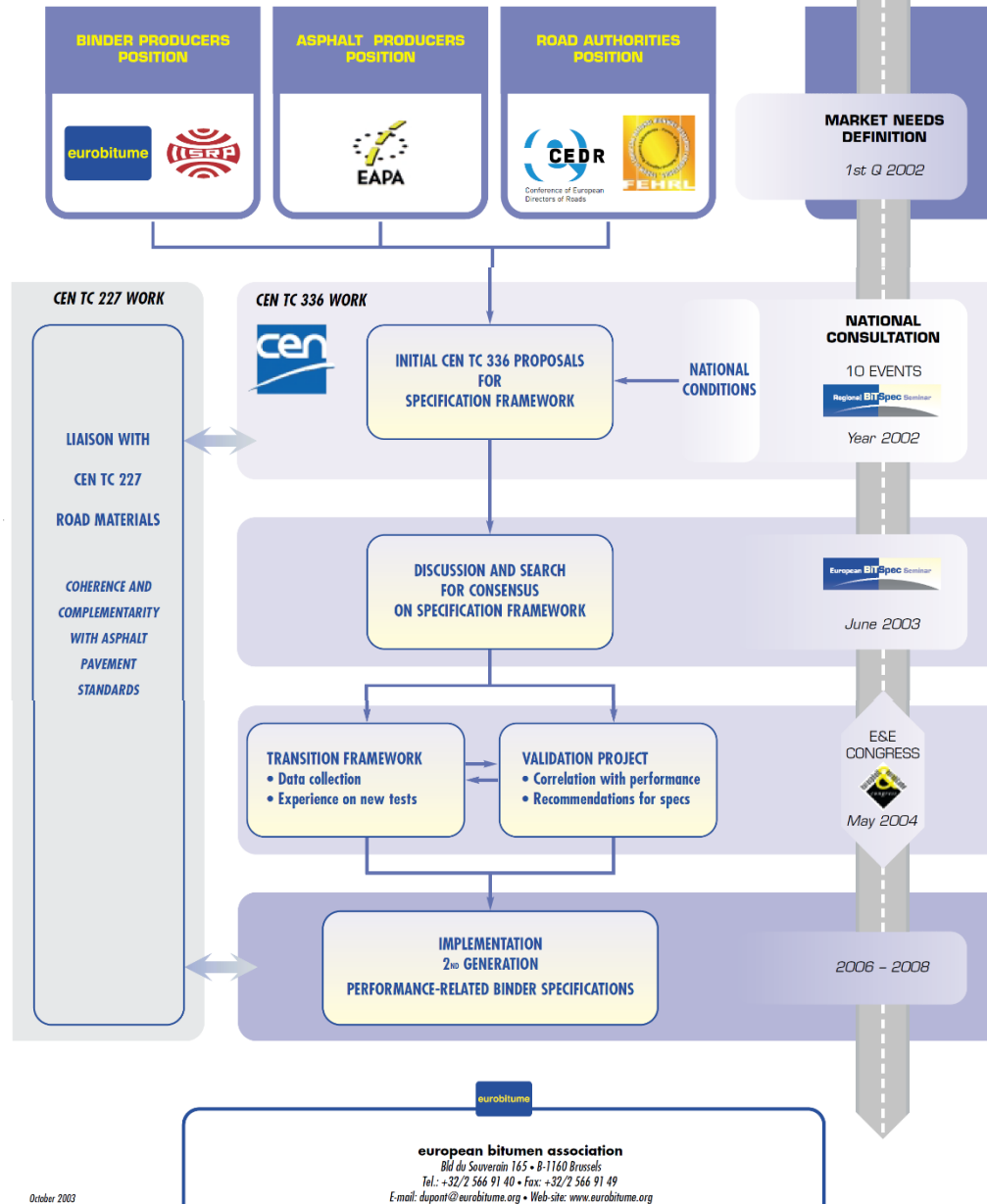
## **In 2002: EAPA Position Paper and Eurobitume Position on Bitumen Specification System**

### **Performance related bitumen standards**

**EAPA:** “It would be preferable to have one system that can cover both straight-run bitumens and polymer-modified bitumens.

**Eurobitume** position on specification system - 21st March 2002: Within a specification system, one should not make a differentiation between "bitumen" and "polymer modified bitumen". The need for adding polymers to meet specified performance is the responsibility of the binder producer.

# SPECIFICATION SYSTEM FOR BITUMINOUS BINDERS DEVELOPMENT PROCESS IN EUROPE



## BiTSpec - BiTVaL





## 10 years after 2002

- In 2012 Eurobitume / CEN TC336 decided to make a difference between simple and complex bitumen
- **Paving grade bitumens** are specified in EN 12591. The material characteristics in EN 12591 relate to the performance of these binders in asphalt mixtures and the relationship between each property measured and asphalt performance is **well understood** and considered to be adequately specified. ... these binders are therefore considered to **exhibit simple behaviour**.
- **PMBs, Hard paving grade bitumens and Multigrade paving grade bitumens** are not adequately described by the existing specifications and therefore the relationship between the properties measured and the asphalt should be improved. These binders are therefore considered to **exhibit complex behaviour**.

**E&E 2016 Paper Planche and Eurovia (49.pdf) wrote:**

*“European refining, French in particular, is currently going through a phase of rationalization and search for maximum flexibility in crude supplies. **For users of bitumen, this creates concerns about the quality and consistency of products delivered, especially as the European standard EN 12591 appears to them as insufficient to ensure satisfactory performance of the finished products, ..***

*The study presented here is focused on asphalt made with pure bitumen.”*



## *In the future*

- Bitumen quality might become issue
  - IMO 2020
  - Less fossil fuel in future; less crude oil?
  - Alternatives for bitumen, like Lignin: organic polymers (from plants)
- Better techniques needed to characterise bitumen
- Bitumen modification by contractor / asphalt producer to obtain performance needed



# *More involvement of asphalt sector needed*

- Bitumen is complex material – even Paving Grade Bitumen
- Better standards / test methods needed to characterise relevant bitumen properties
- The asphalt industry are the buyers and users of the bitumen, so the clients
- The asphalt industry should be more involved and more active in the bitumen standardisation / characterisation process
- We need standards that can describe the properties of the paving grade bitumen in a sufficient way
- The bitumen and the asphalt industry should really work together on this (like we did in the beginning of this century)



# *Rolling Resistance*

to save energy



WATERBOUWKUNDE

DOOR

N. H. HENKET, Ch. M. SCHOLS en J. M. TELDEBS,  
HOOGLEERAREN AAN DE POLYTECHNISCHE SCHOOL TE DELFT.

MET MEDEWERKING VAN

verschillende ingenieurs.

VIERDE DEEL.

AFD. XV. — WEGEN.

Hoofdstuk I, bewerkt door A. FOCK.  
Hoofdstuk II en III, bewerkt door C. J. VAN DOORN.  
Hoofdstuk IV en V, bewerkt door N. H. HENKET.

Met 28 Platen.

'S-GRAVENHAGE,  
DE GEBROEDERS VAN CLEEF.  
1885.

Weerstand op wegen. 505

De weerstand is dus  $\frac{1435}{60.45} = \frac{1}{23.7}$  van het totaal gewicht van den wagen, wat vrijwel overeenkomt met het cijfer, dat door MORIX wordt opgegeven.

Behalve MORIN en MACNEIL hebben nog vele andere personen, als RUMFORD, BEVAN, MINARD, NAVIER, GERSTNER, BOKELBERG, KOSSAK, e. a. door dadelijke proeven den weerstand voor voertuigen op kunstwegen bepaald (1). De volgende tabel geeft, voor verschillende wegen, de uiterste en gemiddelde waarden van den weerstandcoëfficiënt  $\mu$ , opgemaakt uit de resultaten door bovengenoemde waarnemers verkregen.

TOESTAND VAN DEN WEG.	Weerstandcoëfficiënt $\mu$	
	grenswaarden.	gem. waarde.
<i>Aarde- en zandwegen.</i>		
Zandweg . . . . .	$\frac{1}{3}$ tot $\frac{1}{6}$	$\frac{1}{4}$
Slechte kleiweg . . . . .	$\frac{1}{8}$ tot $\frac{1}{5}$	$\frac{1}{6}$
Kleiweg, droog en vast . . . . .	$\frac{1}{7}$ tot $\frac{1}{8}$	$\frac{1}{8}$
Zeër goede kleiweg, droog en vast. . . . .		$\frac{1}{10}$
<i>Grint- en steenslagwegen.</i>		
Nieuw aangelegde grint- of steenslagwegen . . . . .	$\frac{1}{4}$ tot $\frac{1}{3}$	$\frac{1}{4}$
Middelmatige steenslagweg, slijkachtig. . . . .	$\frac{1}{2}$ tot $\frac{1}{3}$	$\frac{2}{5}$
Goede steenslagweg, droog . . . . .	$\frac{1}{3}$ tot $\frac{1}{5}$	$\frac{3}{5}$
Zeër goede steenslag- of Mac-Adamweg, droog . . . . .		$\frac{1}{6}$
<i>Keiweg.</i>		
Slechte keiweg . . . . .		$\frac{2}{5}$
Goede vlakke keiweg . . . . .	$\frac{1}{3}$ tot $\frac{1}{6}$	$\frac{1}{5}$
Zeër goede vlakke keiweg. . . . .		$\frac{1}{7}$
<i>Verschillende andere wegen.</i>		
Goede straatweg . . . . .		$\frac{3}{5}$
Goede houten wegen . . . . .		$\frac{1}{6}$
Asfaltwegen . . . . .	$\frac{1}{10}$ tot $\frac{1}{10}$	$\frac{1}{10}$
Wegen bedekt met losse sneeuw . . . . .		$\frac{1}{5}$
Wegen bedekt met vastgereden sneeuw . . . . .		$\frac{1}{3}$
Spoorwegen . . . . .	$\frac{1}{10}$ tot $\frac{1}{10}$	$\frac{1}{10}$
Waterwegen . . . . .	$\frac{1}{10}$ tot $\frac{1}{10}$	$\frac{1}{10}$

(1) Der Strassen und Eisenbahnbau von M. BECKER. 1876.

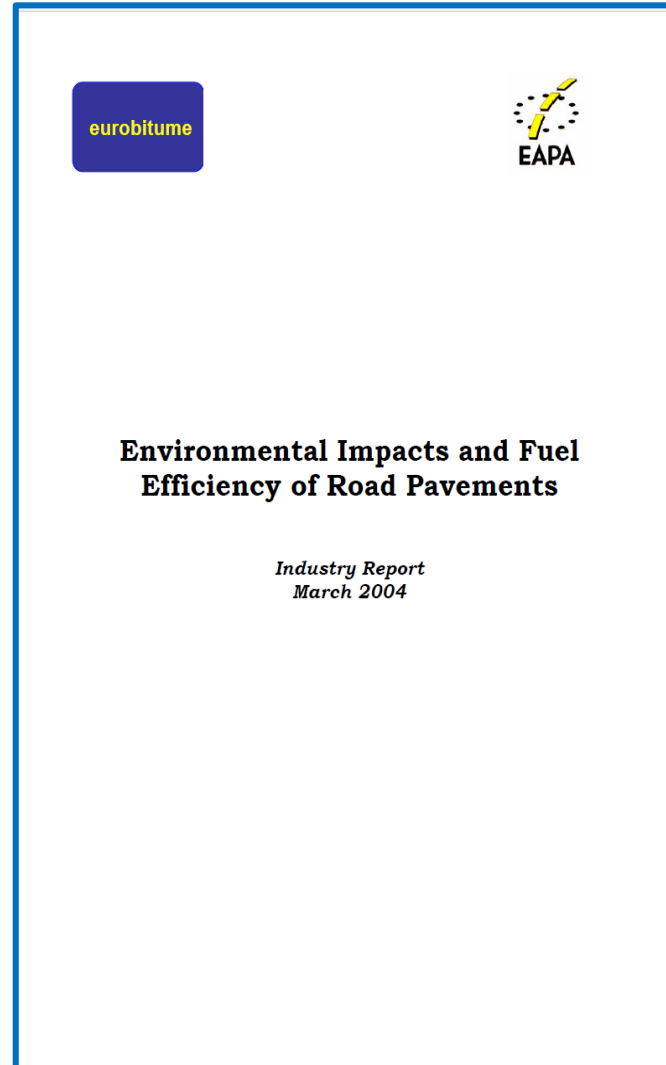


# *In 2000 it came back on the agenda*

## IRF 2001: A Life-Cycle Analysis Of The Environmental Impacts of Asphalt and Concrete Roads:

Various studies have shown that due to its rigid composition a concrete pavement can provide as much as a **20% reduction in fuel mileage**

Authors are from:  
Dufferin Custom Concrete Group  
Cement Association of Canada



## Saving CO<sub>2</sub> by upgrading Europe's road network – Common Position Paper of Road Industry

FIRM17, Brussels  
6<sup>th</sup> April 2017

Dr. Carsten Karcher – EAPA  
Karl Downey - EUPAVE

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# Rolling Resistance

## WORKING TOGETHER

- Creating a joint position and inform about CO<sub>2</sub> reduction of vehicles by addressing rolling resistance of road infrastructure
- Show **different scenarios and their consequences** for the CO<sub>2</sub> emission reduction of vehicles
- Make the link to other policies on CO<sub>2</sub>
- Provide data

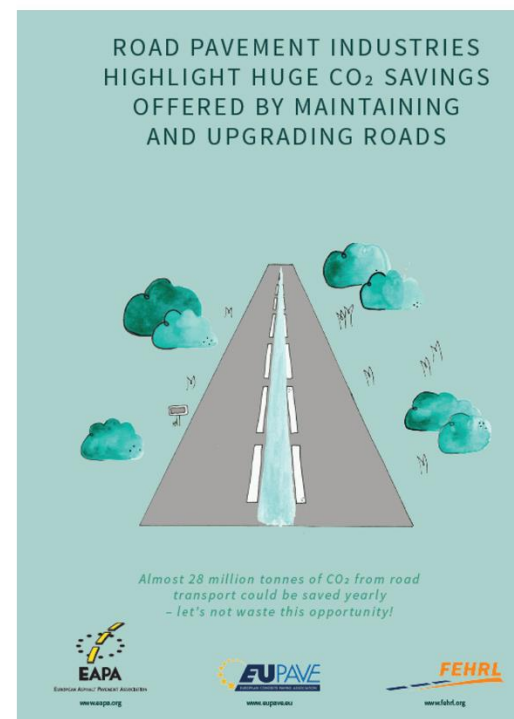


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## POSITION PAPER

Available since  
Autumn 2016!



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2018: In Denmark they developed a SMA 8 KVS (KVS means Climate Friendly Surface)

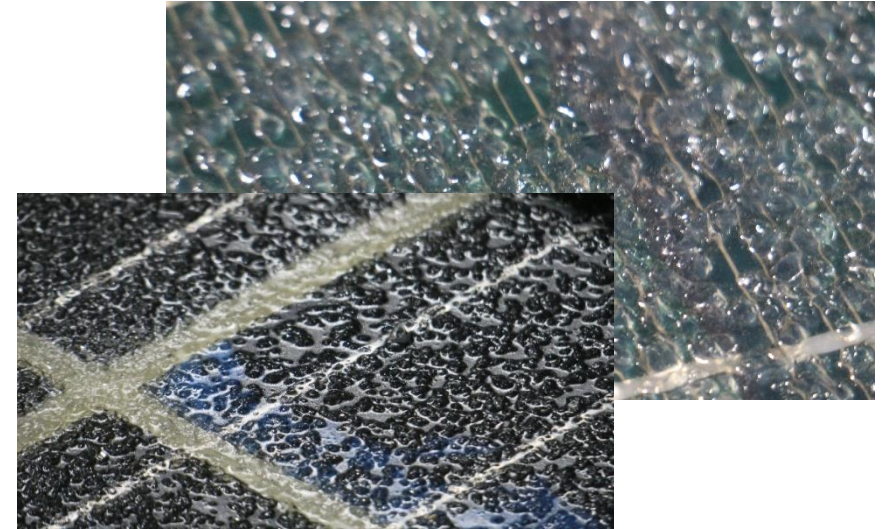
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# *Asphalt paving and compaction*





# New technologies





# *Innovations that did not (really) make it*



**Rollpave**



**Amir roller**





# Implementation takes too much time



Figure 5. The temperature scanner mounted on the paver

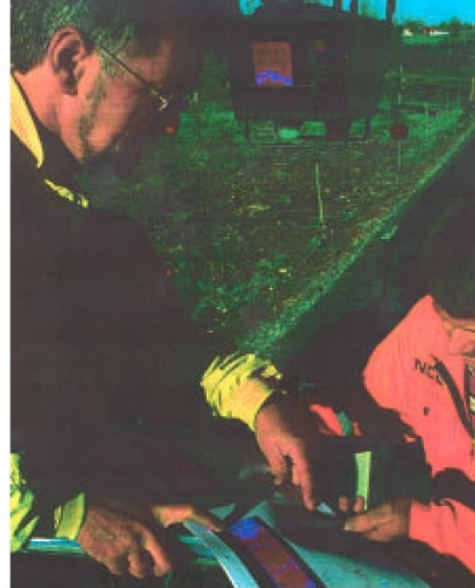


Figure 5. The temperature scanner mounted on the paver.

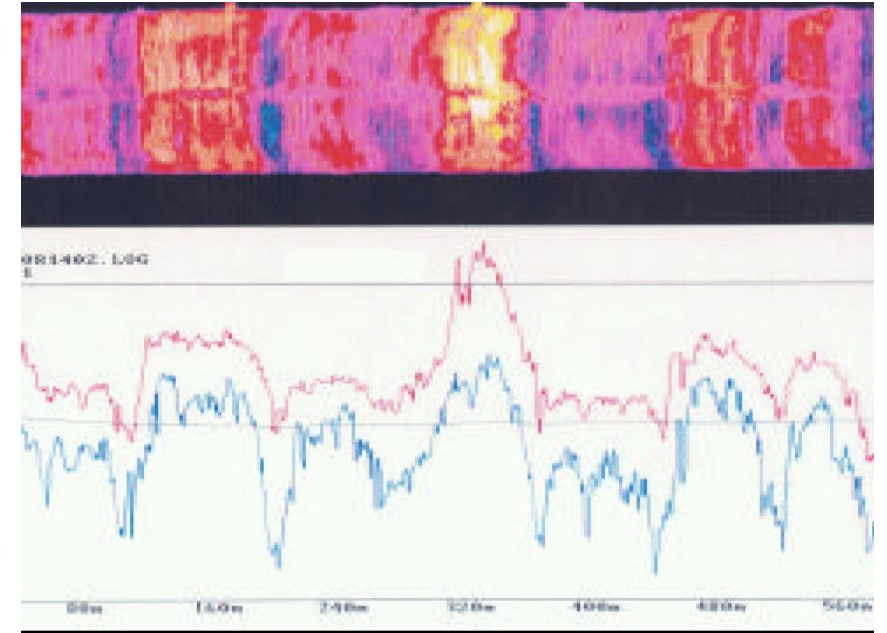


Figure 7. Segregation and variation in mix temperature

E&E Congress 2000

2<sup>nd</sup> Eurasphalt & Eurobitume Congress Barcelona 2000 – Proc.0052.uk

## TEMPERATURE SCANNER – AN INSTRUMENT TO ACHIEVE A HOMOGENOUS ASPHALT PAVEMENT

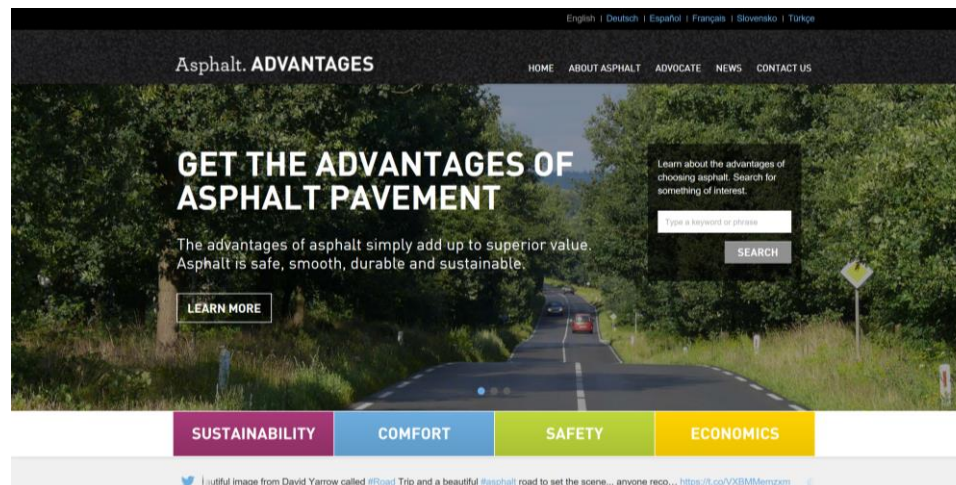
Ulmgren, Nils

Development Manager Asphalt  
Ncc Ab, Sweden



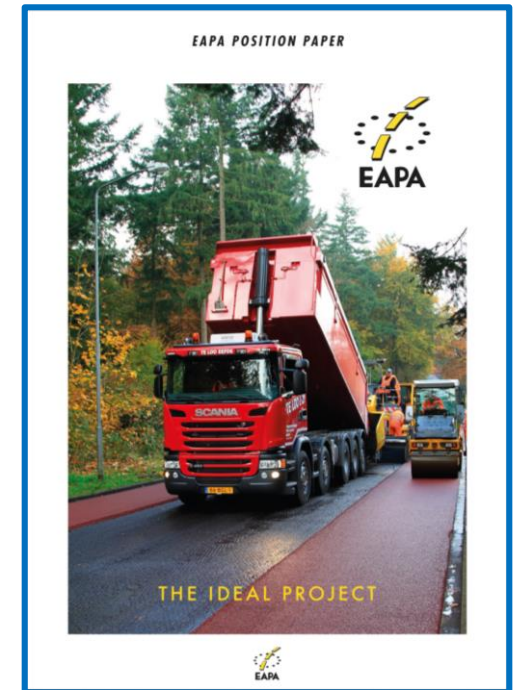
# Other achievements

- Carbon Footprint Calculators
- Warm Mix Asphalt Technologies
- Workers health improvements – Engineering controls
- European Asphalt standards
- Many new European test methods
- Etc



# Summary

- Digitalisation can and will offer a lot of opportunities
- We made a lot of progress regarding asphalt mixtures
- Better techniques needed to characterise bitumen
- Rolling Resistance is back (after 130 years) and relevant (again)
- Several tools (machines and electronic equipment) were developed to provide homogenous and improved quality and they should be implemented / used



# *Conclusions*

**The asphalt industry** should become

- more active regarding bitumen characterisation
- more involved in bitumen standardisation

**The asphalt industry (associations)** need to talk / work with the road authorities

- To get contracts that stimulate innovations / the use of new technologies  
If there is no incentive to innovate, it will not happen
- To work together (with road authorities) on digitalisation, also to be able to exchange data



# *Main message*

If we want

- to make progress
- to remain attractive
- to be sustainable
- to innovate,

**we have to work together in the whole chain**

If we do not work together now, we will become old-fashioned, unattractive, get less students, less people available for the road authorities, contractors, consultants, etc.



