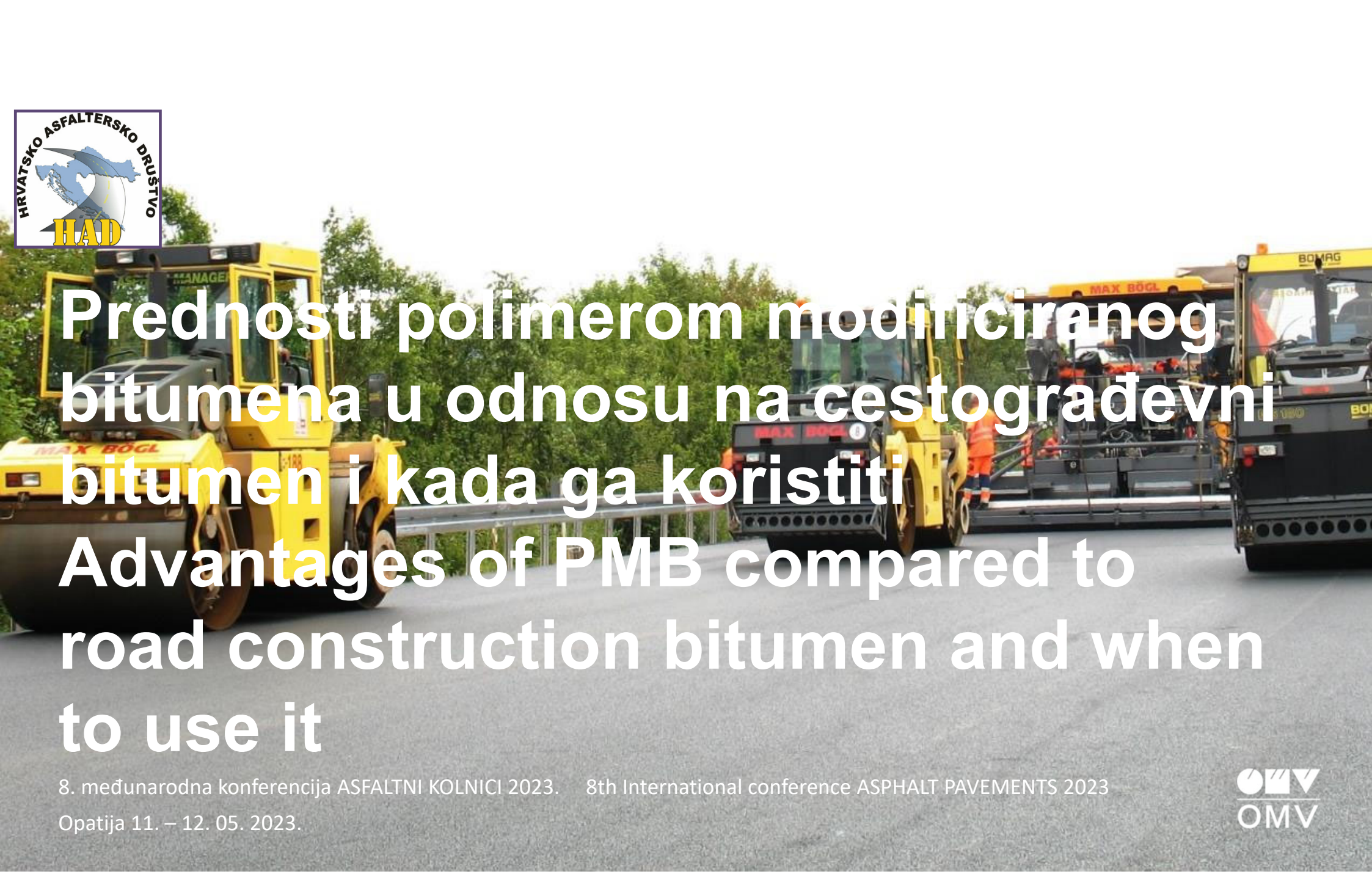


Prednosti polimerom modificiranog bitumena u odnosu na cestograđevni bitumen i kada ga koristiti

Advantages of PMB compared to road construction bitumen and when to use it

8. međunarodna konferencija ASFALTNI KOLNICI 2023. 8th International conference ASPHALT PAVEMENTS 2023

Opatija 11. – 12. 05. 2023.

Content

Example for a road with PmB

17 years old heavy trafficked road in Austria

Example for a road with PmB

17 years old heavy trafficked road in Austria

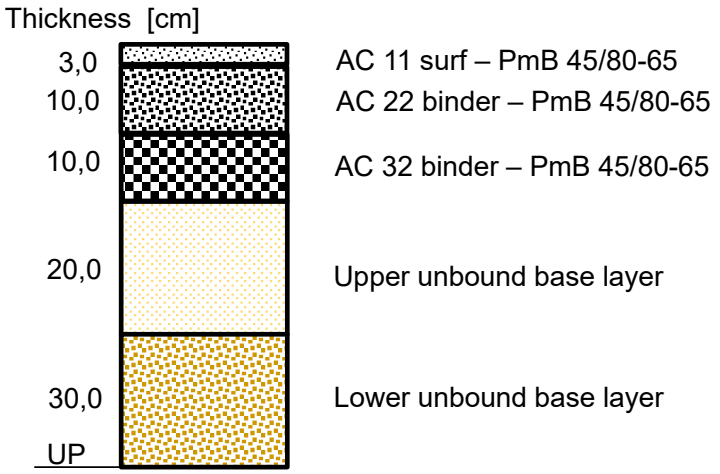
movie

Road with PmB – still excellent condition with no maintenance so far

17 years old heavy trafficked road in Austria

- Released to traffic in 2006
- Appr. 10.000 vehicles/day (2022)
- Appr. 75% cars and 25% other vehicles
- Further traffic increase expected (industrial area)
- No maintenance so far
- No cracks
- No rutting in both directions

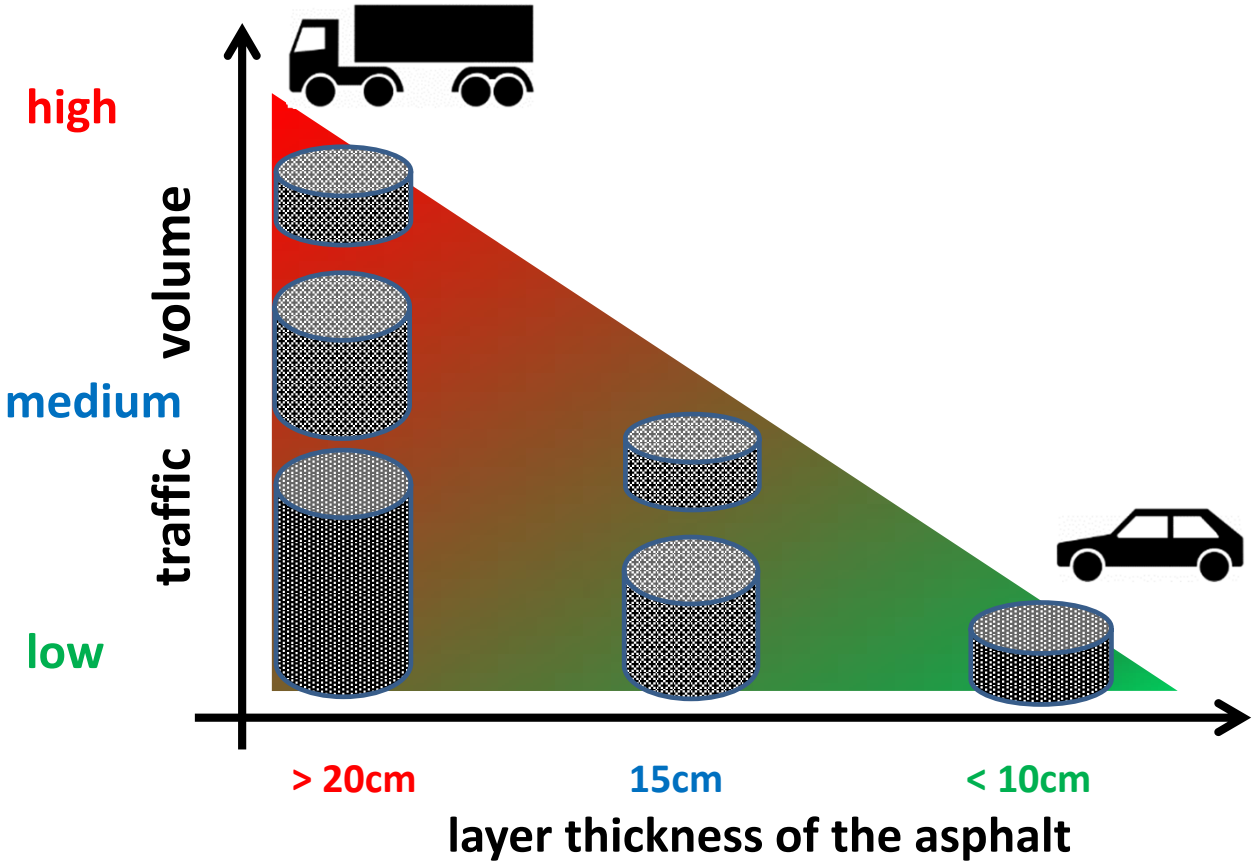
Layer thickness load class 25



Content

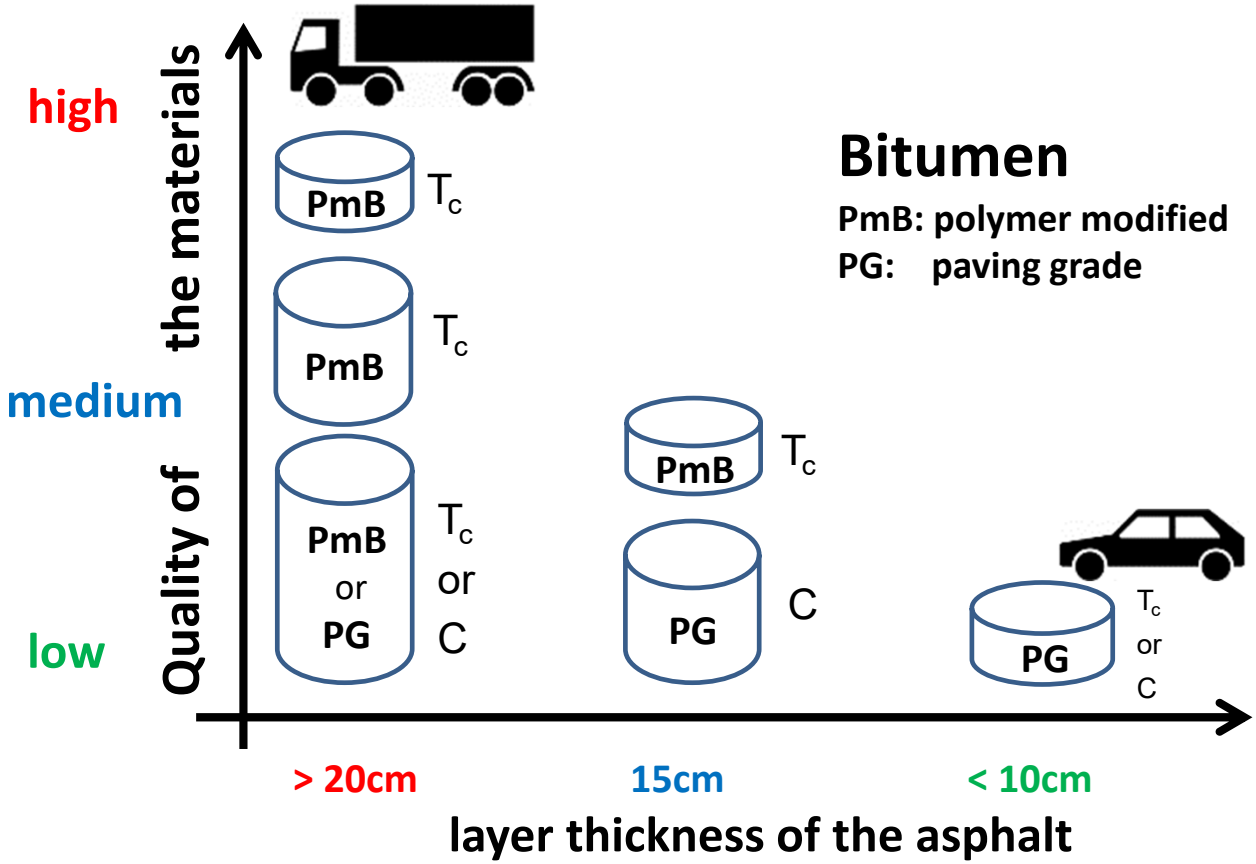
Various layer thickness and number of layers

Road design – simplified basics



Quality of material depending on amount of heavy goods traffic

Road design – simplified basics



Bitumen

PmB: polymer modified
PG: paving grade

Clearly improved properties of PmB

Comparison of product specification

EN12591 – paving grade bitumen

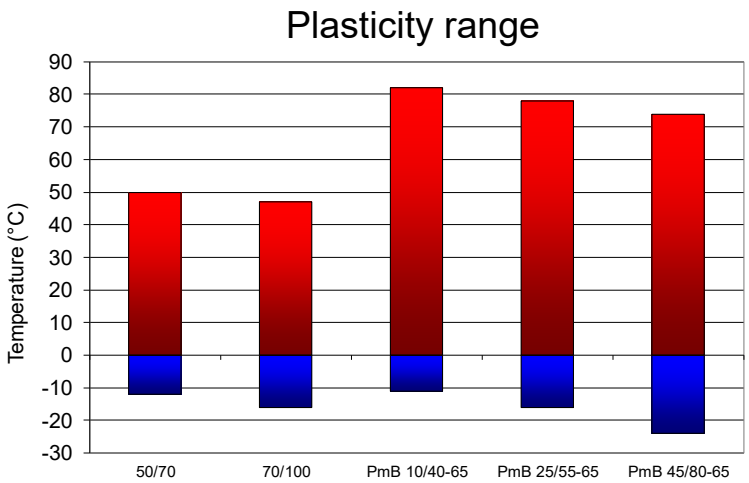
Type of binder			35/50	50/70	70/100
Requirement/Characteristic	**Test method**	**Unit**	**Range of values**		
Penetration at 25 °C	EN 1426	x0.1 mm	35–50	50–70	70–100
Softening point	EN 1427	°C	50–58	46–54	43–51
Mass change at 163 °C	EN 12607-1	%	≤ 0.5	≤ 0.5	≤ 0.8
Retained penetration	EN 1426	%	≥ 53	≥ 50	≥ 46
Increase in softening point	EN 1427	°C	≤ 8	≤ 9	≤ 9
Flash point	EN ISO 2592	°C	≥ 240	≥ 230	≥ 230
Fraass breaking point	EN 12593	°C	≤ –5	≤ –8	≤ –10
Solubility	EN 12592	% (m/m)	≥ 99.0	≥ 99.0	≥ 99.0
Dynamic viscosity at 60 °C	EN 12596	Pa.s	≥ 225	≥ 145	≥ 90
Kinematic viscosity at 135 °C	EN 12595	mm²/s	≥ 370	≥ 295	≥ 230

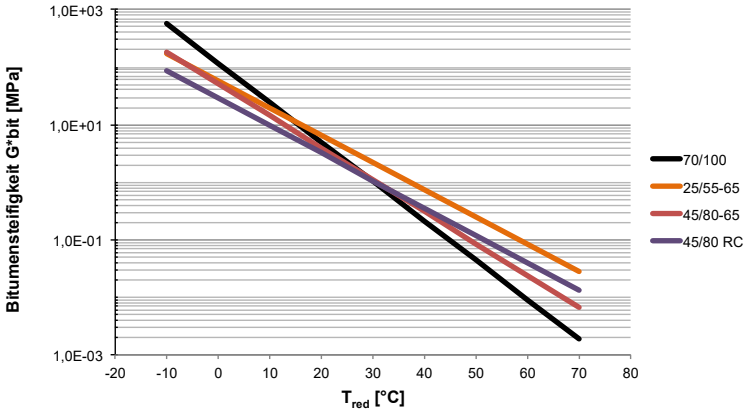
EN14023 – polymer modified bitumen

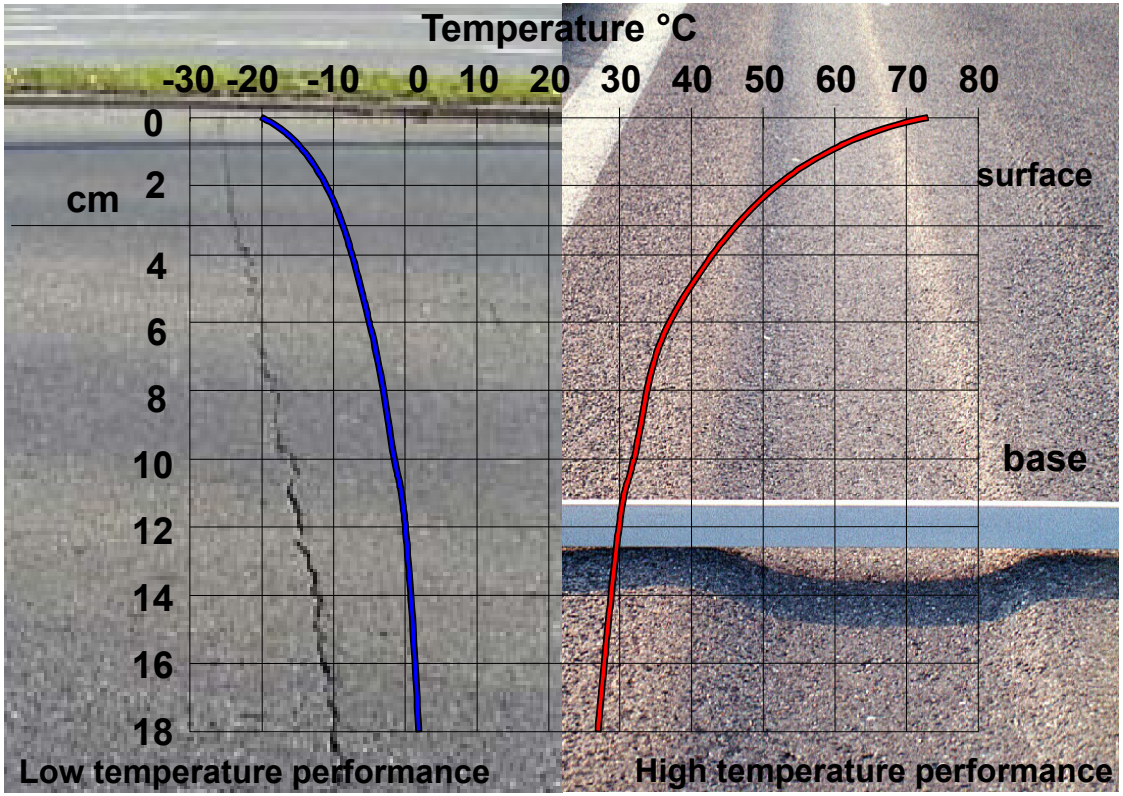
Type of binder			25/55-65	45/80-55	45/80-65
Requirement/Characteristic	**Test method**	**Unit**	**Range of values**		
Penetration at 25 °C	EN 1426	x0.1 mm	25–55	45–80	45–80
Softening point	EN 1427	°C	≥ 65	≥ 55	≥ 65
Force ductility	EN 13703 EN 13589	J/cm²	≥ 3 (5 °C) ≥ 3 (10 °C)	≥ 2 (5 °C)	≥ 3 (5 °C)
Mass change at 163 °C	EN 12607-1	%	≤ 0.5	≤ 0.5	≤ 0.5
Retained penetration	EN 1426	%	≥ 60	≥ 60	≥ 60
Increase in softening point	EN 1427	°C	≤ 8	≤ 8	≤ 8
Flash point	EN ISO 2592	°C	≥ 250	≥ 235	≥ 250
Fraass breaking point	EN 12593	°C	≤ –12	≤ –15	≤ –18
Elastic recovery (25 °C)	EN 13398	%	≥ 80	≥ 50	≥ 80
Storage stability: difference in softening point	EN 13399 EN 1427	°C	≤ 5	≤ 5	≤ 5
Elastic recovery (25 °C) acc. to EN 12607-1	EN 13398	%	≥ 60	≥ 50	≥ 70

Plasticity range versus climatic conditions

Different performance of different binder





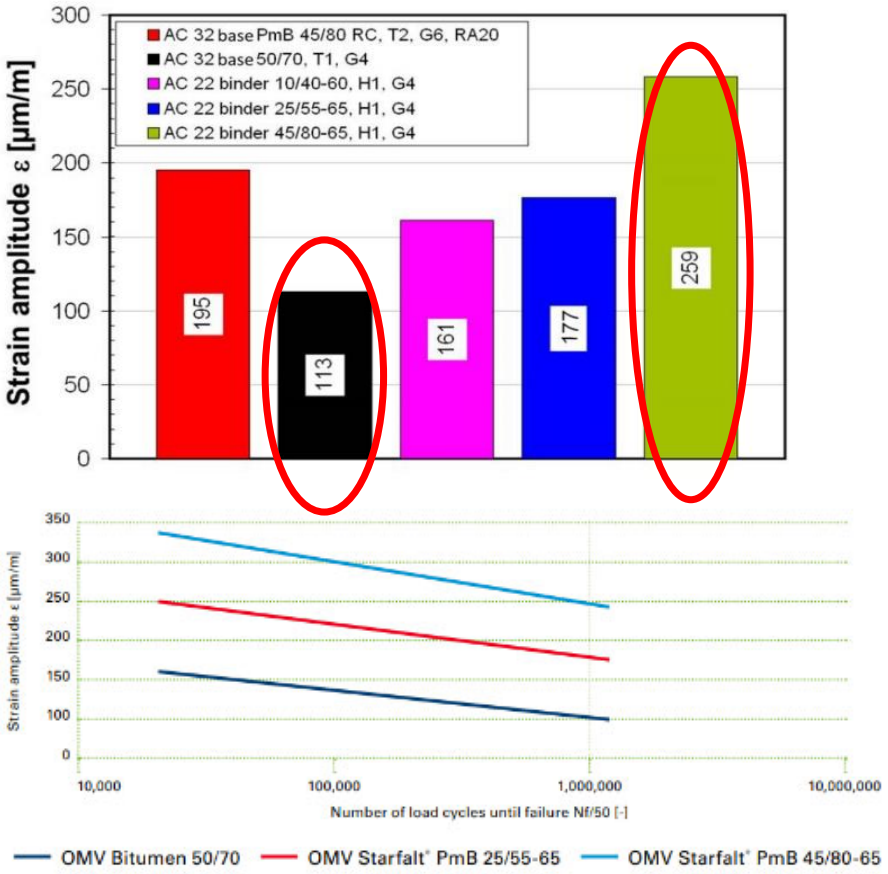


Higher fatigue and rutting resistance of PmB – long lasting roads

Performance related asphalt tests

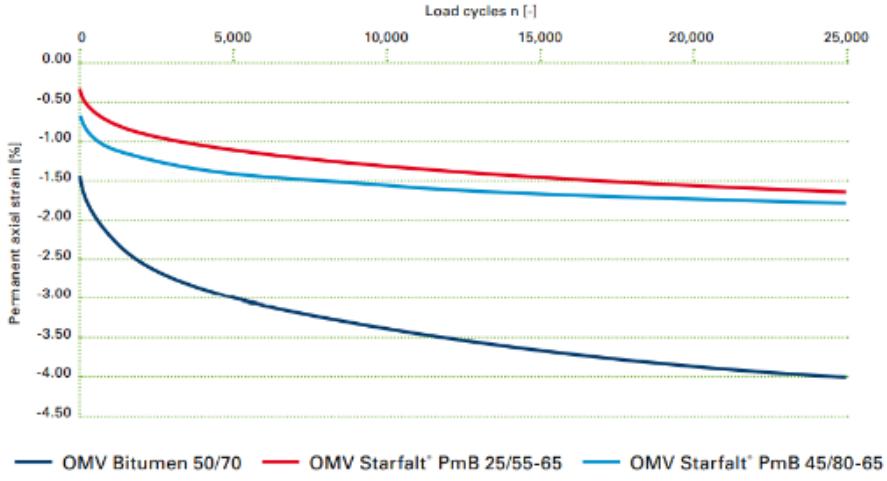
Durability ε_6

Test results of AC 22 & AC 32



Permanent deformation (Triaxial test)

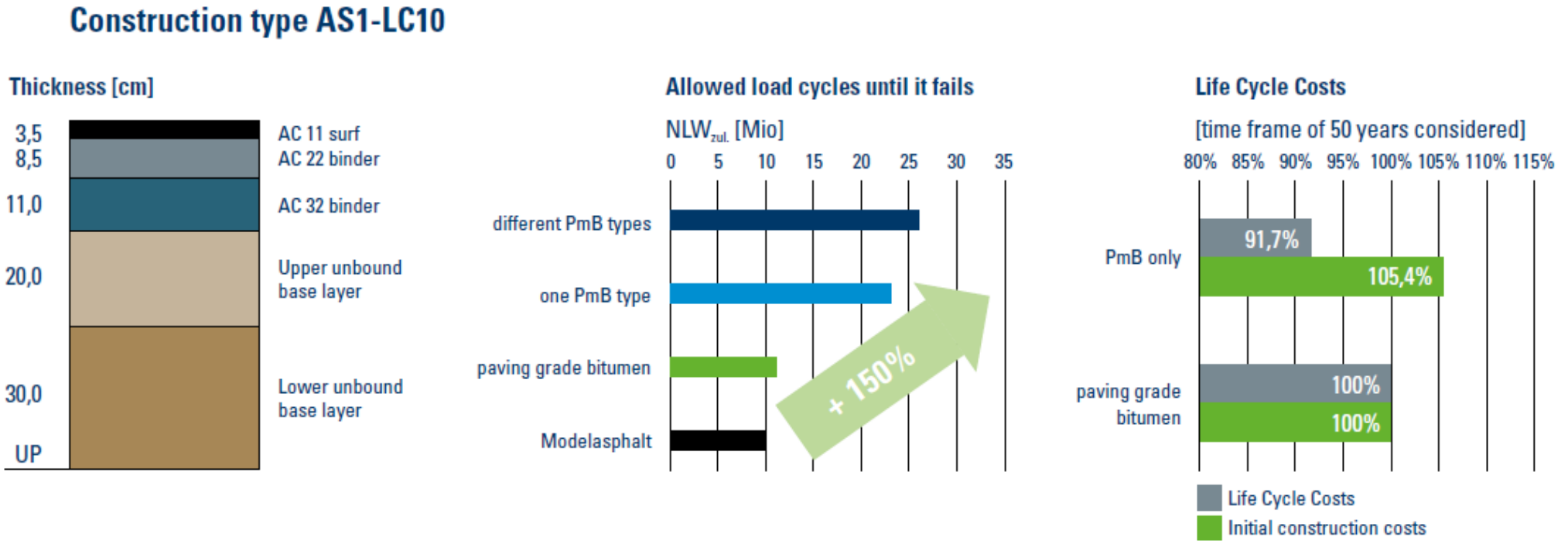
Test results of AC with various bitumen



- Higher fatigue resistance (higher ε_6- Value) – **longer lifetime**
- Less permanent deformation – **less rutting**
- Higher flexibility – **less cracks**

PmB improves prolongs the lifetime of a road and reduce the Life Cycle Costs

Pavement Design and LCCA results



Life Cycle Costs Analysis – LCCA
Standard cycles in the consideration period

Construction type AS1-LC10

Time frame of 50 years were taken into consideration

Variant	description	maintenance measure			reconstruction of bit. bound pavement	residual value after 50 years (bit. bound pavement)
		crack maintenance		reconstruction surface layer		
		year [a]	share [%]	year [a]	Year [a]	[%]
variant I	only PgB	13/17/36/39	8,8	-	22/43	66,7
variant II	surface layer with PmB	15/37	9,0	-	22/43	66,7
variant III a/b	surface and binder layer with PmB	15/40	9,0 / 6,6	20/45	24/50	100
variant IV a	only PmB	15/30/34	9,0	20	39	71,8
variant IV b/c		15/30/34/39	9,0	20	44	86,4

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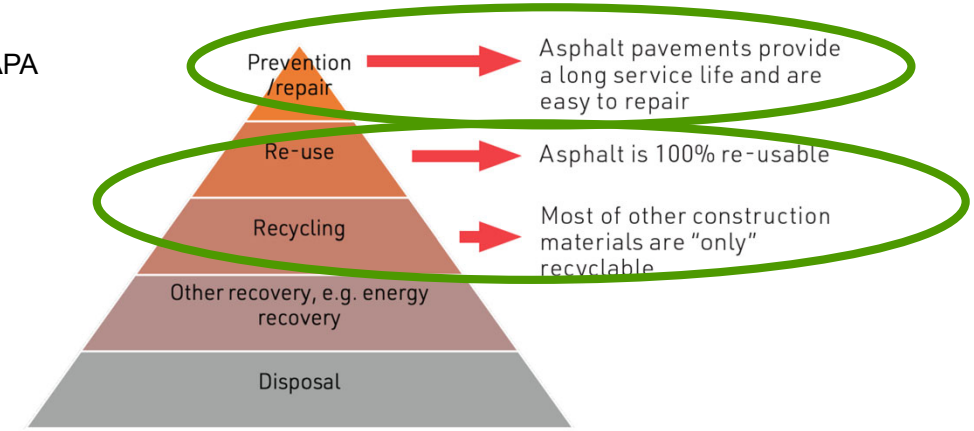
Content

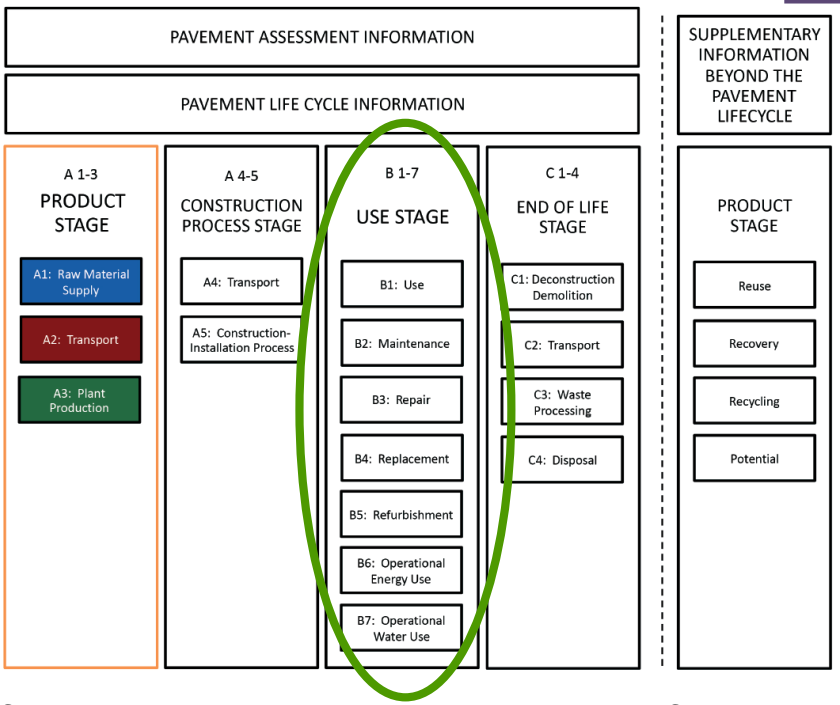
Waste hierarchy – Environmental Product Declaration – Green Public Procurement

Impact of PmB on various future topics

@EAPA



Asphalt within the waste hierarchy established by the Directive 2008/98/EC



@EAPA

Driver for premium products / polymer modified bitumen

- Global warming
- Increasing traffic and heavy-duty transports
- Work-place exposure limits
- Less noise and longer lasting / perpetual roads
- New additives and bio components / bio blends

Reuse of reclaimed asphalt pavements (RAP)

Asphalt mix production and road paving

Reclaimed **A**sphalt **P**avement
- Old asphalt (after 10-20 years)
- 100% recyclable / reusable
- solid
- Bitumen is hard and brittle

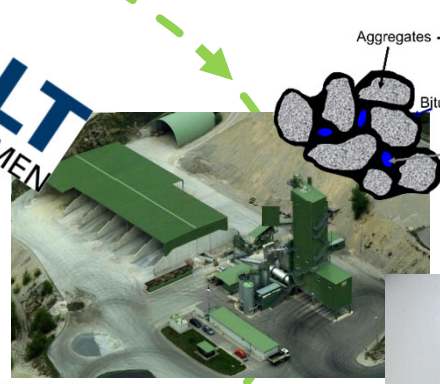
RAP

Refinery

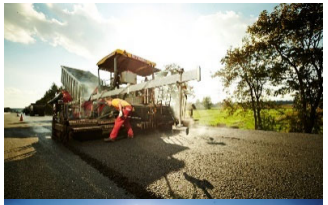
OMV STARFALT HIGH PERFORMANCE BITUMEN

Bitumen transport

- Truck
- Liquid
- Hot (170-200°C)
- ADR relevant

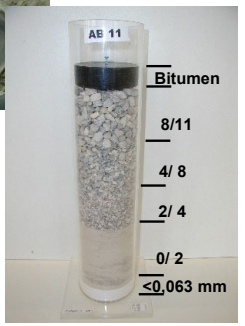


Road paving



Transport to construction site

Asphalt mixing plant



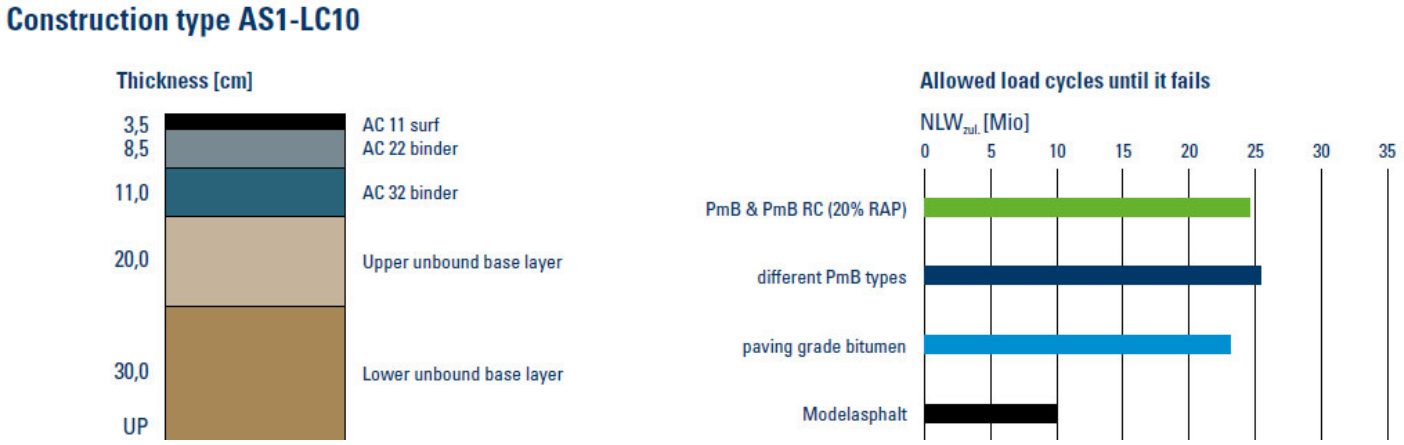
Road maintenance

Road under traffic

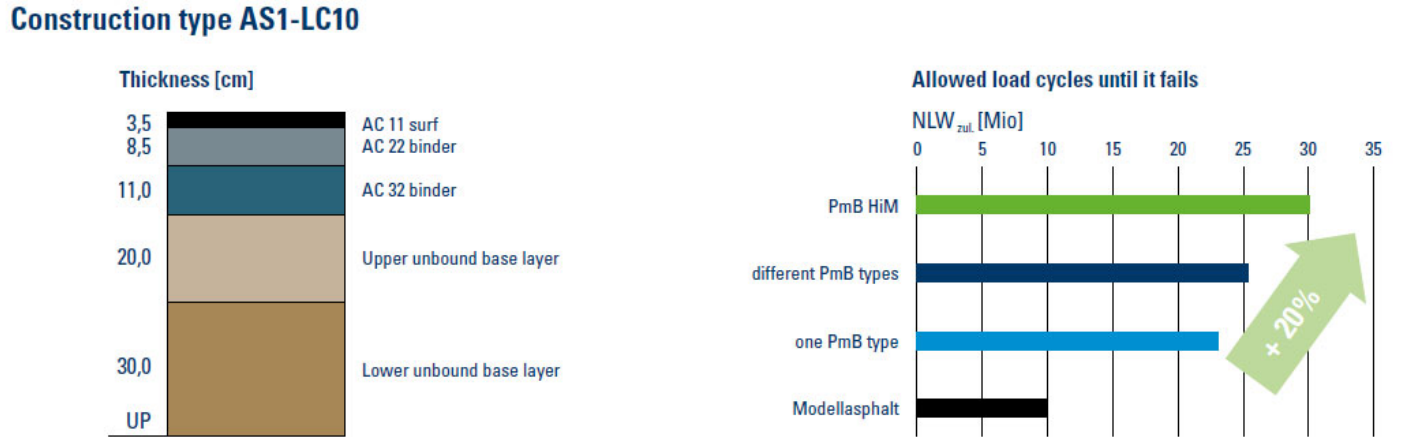
PmB 45/80 RC to increase RAP content – PmB HiM for perpetual roads

Product developments for future challenges

PmB 45/80 RC



PmB 45/80-80 HiM



Content

Conclusion and main take aways

- Polymer modified Bitumen guarantees **long lasting roads**
  - Less permanent deformation
  - Higher fatigue resistance
  - Less cracks
  - Less and later maintenance
  - **Saving money** on a long run – LCCA
  - Lower CO2 footprint of a road (life circle)
- Proven quality by **reference across Central Eastern Europe** incl. Croatia
- **Already now solutions for future challenges**
  - Reuse of reclaimed asphalt on Motorways (12 years experience)
  - PmB HiM for perpetual roads

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