Hrvatsko asfaltersko društvo **Croatian asphalt association**

Devetogodišnje iskustvo u recikliranju asfalta u Austriji

Nine years' experience with Asphalt recycling in Austria

Markus Spiegl– OMV Refining & Marketing

Međunarodni seminar ASFALTNI KOLNICI 2019

International seminar ASPHALT PAVEMENTS 2019

Opatija, 04.–05. 04. 2019.

Content

- Bitumen ageing and upgrade of quality
- Bituminous binder properties
- Status of previous test tracks now
- Map of projects for reuse of reclaimed asphalt 2010-2017
- Pavement structure - highway load class 10
- Next steps
- Events
  - 7th E&E Congress in Madrid 2020
  - International Pavement Design Workshop 2020

Question of mind?

Recycling of asphalt - why?

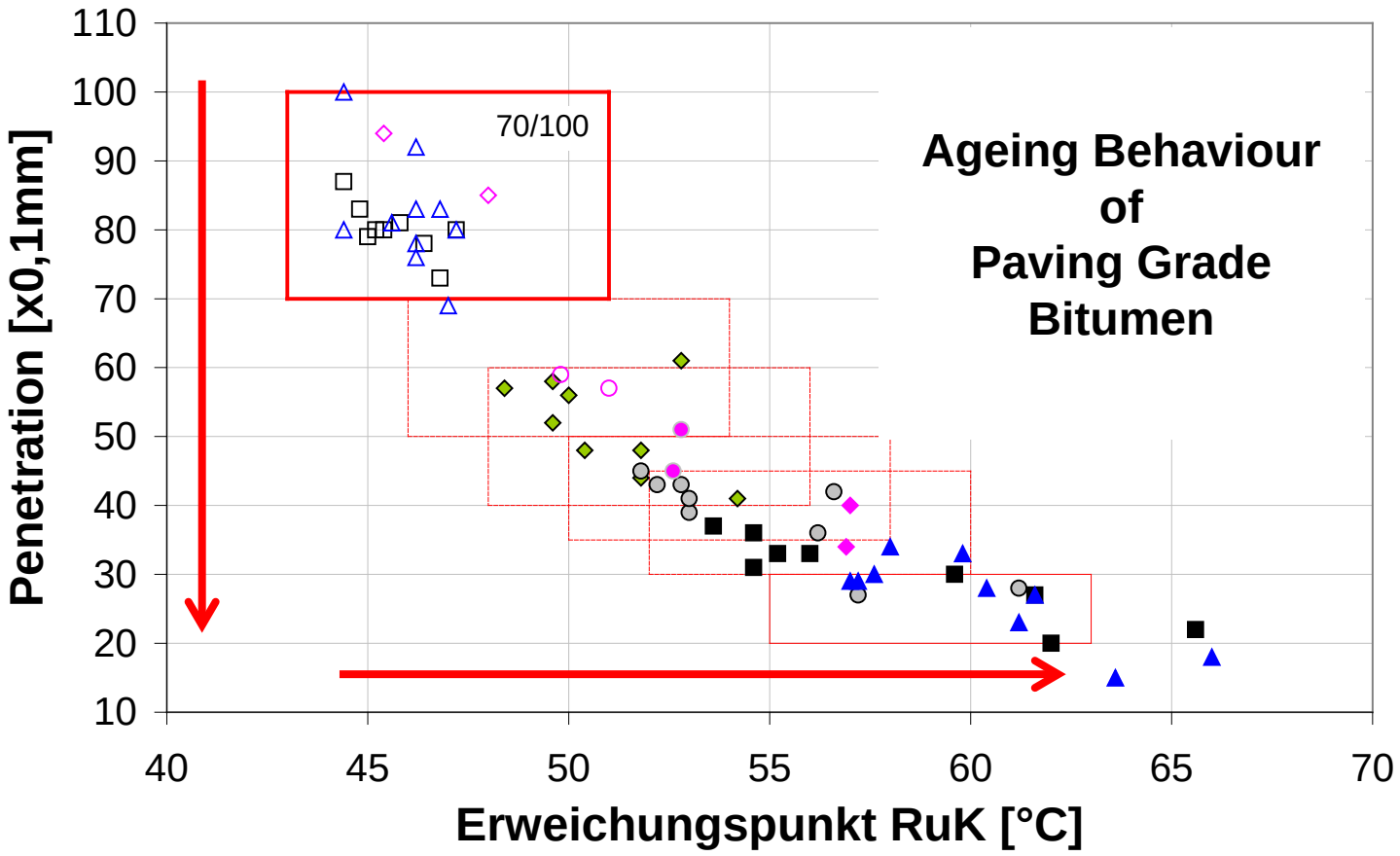
Careful treatment of resources

- use existing raw material
- reduce import of crude oil/bitumen
- reducing production costs

Environment protection

- reduce transport volume
- reduction of emissions (noise, dust, exhaust gas,..)
- careful treatment of disposal sites

Bitumen ageing and upgrade of quality



Performance increase:

- Higher Pen
- Modify Soft. P.
- Lower FBP
- El. recovery

+ OMV Starfalt PmB RC

Bitumen ageing and upgrade of quality

- Old recycled asphalt has an average content of 3,5% aged bitumen of penetration 10-20 and Breaking Point Fraass close to 0°C
- If PmB was used typically the performance is reduced, lower elastic performance and it is depending on properties of initial use fresh PmB
- High variation in RAP qualities
  - Second, third category roads (all layers at one)
  - Highway, maybe layer by layer; older highways no PmB
- By recycling up to 80%, you get 2,8% brittle bitumen into the new mixture – quality of this product? (high risk of early cracking!)
- For base or binders layers you can add only 1,3% fresh bitumen, which means that this “Recycling Bitumen” has to fulfil highest quality requirements
- The use of special polymer modified bitumen showed the best results

Bituminous binder properties

Type of Binder acc. EN 14023		OMV Starfalt® PmB 25/55-65	OMV Starfalt® PmB 45/80-65	OMV Starfalt® PmB 45/80 RC
Requirement / Characteristic	**Unit**	**Range of Values**		
Penetration at 25°C	x0.1 mm	25 - 55	45 - 80	45 - 80
Softening point	°C	≥ 65	≥ 65	≥ 70
Force ductility	J/cm²	≥ 3 (5°C) ≥ 3 (10°C)	≥ 3 (5°C)	≥ 3 (5°C)
Mass change at 163°C	%	≤ 0,5	≤ 0,5	≤ 0,5
Retained penetration	%	≥ 60	≥ 60	≥ 60
Increase in softening point	°C	≤ 8	≤ 8	≤ 8
Flash point	°C	≥ 250	≥ 250	≥ 250
Fraass breaking point	°C	≤ – 12	≤ – 18	≤ – 18
Elastic recovery (25°C)	%	≥ 80	≥ 80	≥ 80
Storage stability - difference in softening point	°C	≤ 5	≤ 5	≤ 5
Elastic recovery (25°C) acc. to EN 12607	%	≥ 60	≥ 70	≥ 70

Description according to current valid EN14023 (2010)

According to CEN rules **no additional requirements like**

DSR, MSCRT or BBR are allowed in national standards!

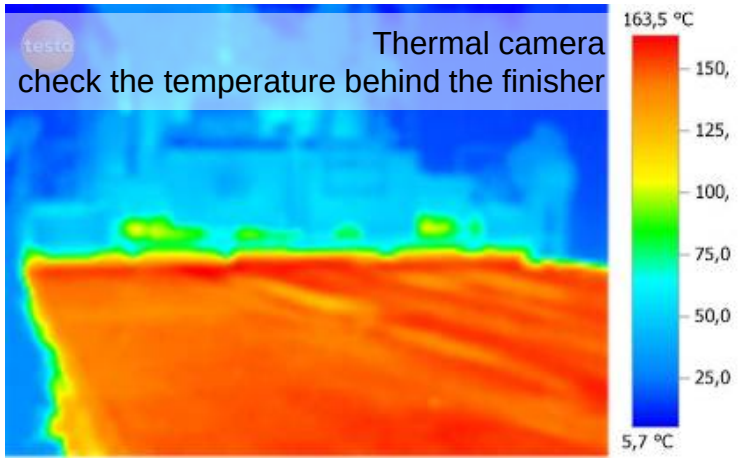
First test track in AT - Laßnitzthal

Research project – recycling asphalt
L 384 Laßnitzthal (Styria):

- length: ~ 0,55 km
- Asphalt concrete (AC 16 & AC 32)
  - 15% & 20% recycling asphalt
- **52 t OMV Starfalt® PmB 45/80 RC**
- 1.300 t Asphalt

result:

- OMV Starfalt® PmB 45/80 RC after ageing > 85% elastic recovery
- Asphalt meets the requirements for highways, despite 20% reclaimed asphalt (not specifically designed for it)



Properties of reclaimed asphalt

Recycling asphalt RA 0/22 (Prüfbau):

Test results of reclaimed asphalt:

„ Bitumen amount (solvable):	3,8 %	
„ amount ≤ 0,063mm:	8,8 %	(grain size)
„ amount ≤ 2 mm:	29,8 %	(grain size)
„ amount > 16 mm:	6,0 %	(grain size)
„ amount ≤ 0,063mm:	1,5 %	(part size)
„ amount ≤ 2 mm:	8,0 %	(part size)
„ amount > 16 mm:	17,0 %	(part size)

- Softening point (recovered bitumen): 70°C
- Penetration (recovered bitumen): 15 1/10mm
- Total amount of reclaimed asphalt: ca. 225 To asphalt

L 384 (Styria)

Paving of AC trag

Paving of AC trag

Performance related asphalt tests (PRT)

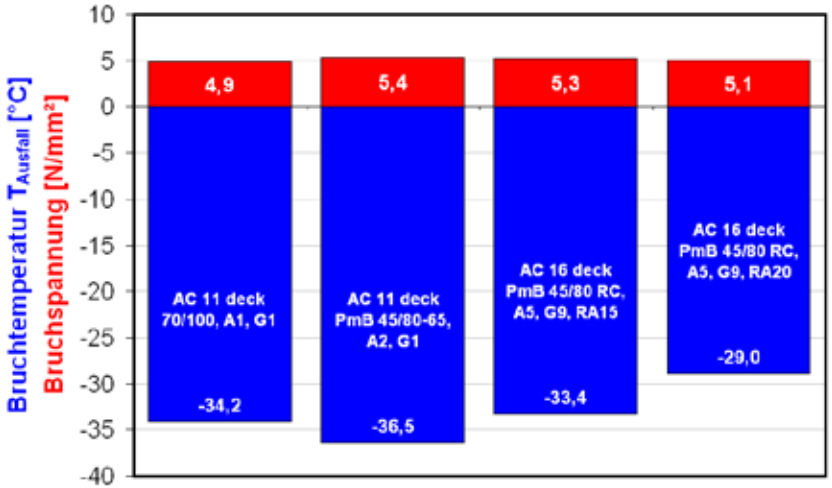
sample	Test				
	TSRST	TCCT	4-PBB	H_2O-content	Bitumen recovering
AC 32 trag PmB 45/80 RC, T2, G6, RA20	X	X	X	-	X
AC 16 deck PmB 45/80 RC, A5,G9, RA15	X	X	-	-	X
AC 16 deck PmB 45/80 RC, A5,G9, RA20	X	X	-	-	X
Recycling asphalt RA 0/22	-	-	-	X	X
Dry asphalt mixture (TMG)	-	-	-	-	X

PRT results – TSRST

Fracture temperature & failure stress

AC 16 deck 45/80 RC, RA 15 & RA20

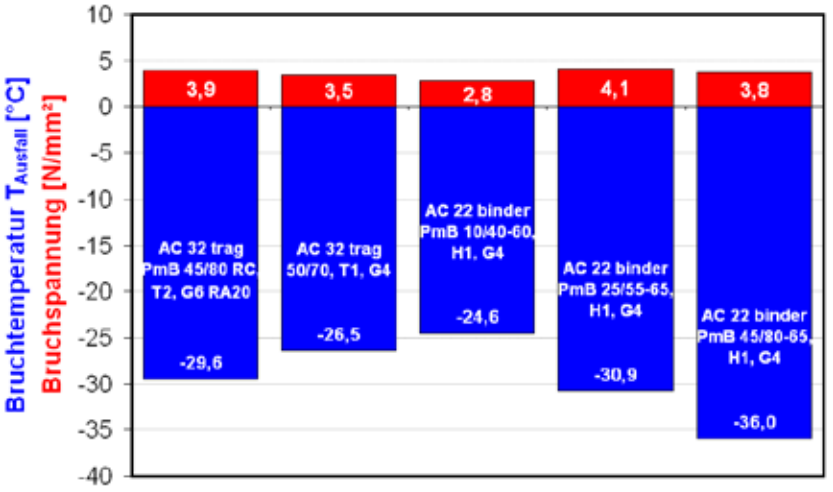
Comparison with other AC 11 with other bitumen types without RA



Fracture temperature & failure stress

AC 32 trag 45/80 RC, T2, G6, RA20

Comparison with other AC 22 & AC 32 with other bitumen types without RA

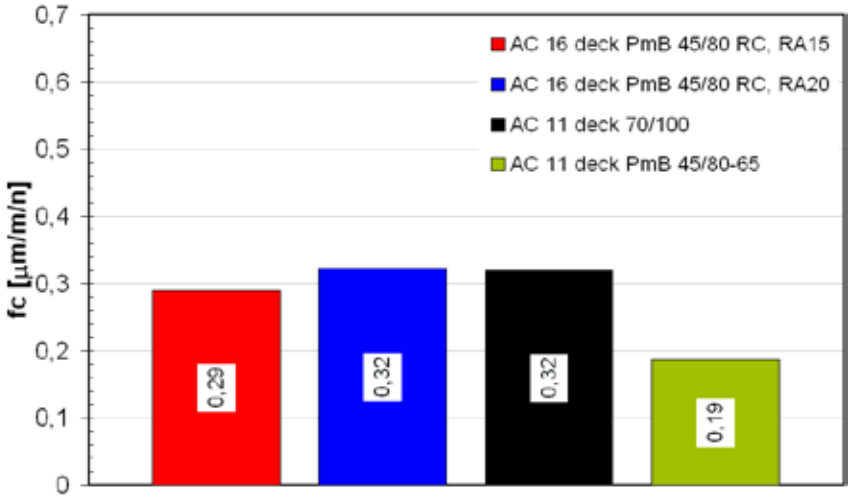


PRT results – TCCT

Creep parameter f_c

AC 16 deck 45/80 RC, RA 15 & RA20

Comparison with other AC 11 with other bitumen types without RA



Creep parameter f_c

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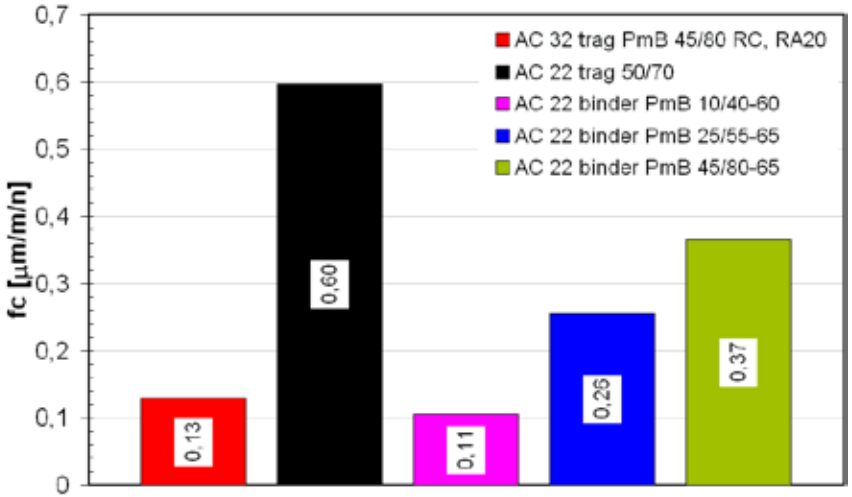
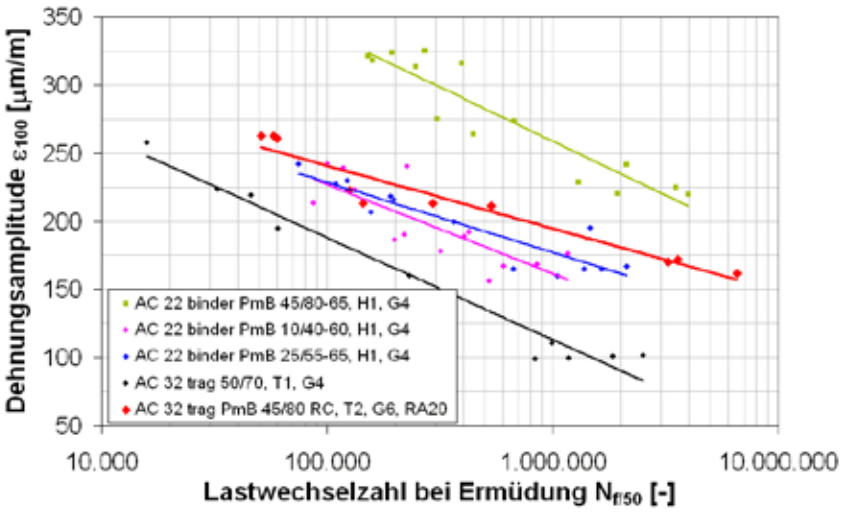


Fatigue behavior – recycling asphalt

Wöhler curves

AC 32 trag 45/80 RC, T2, G6, RA20

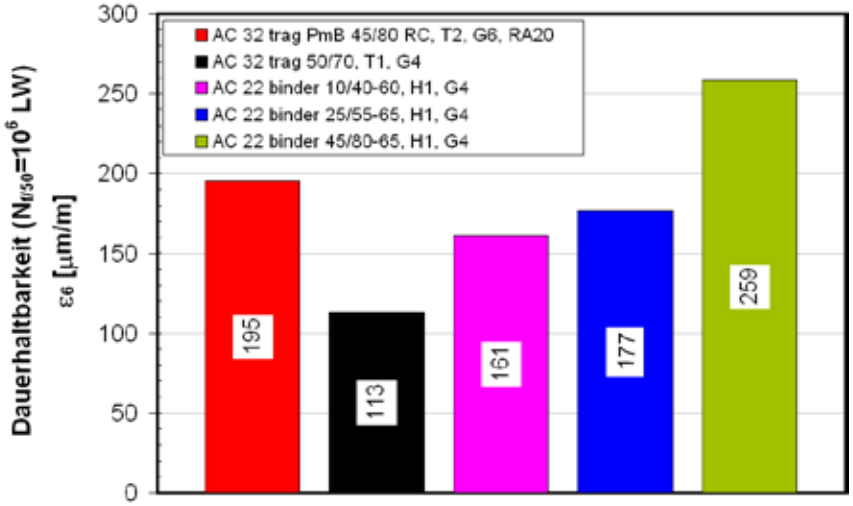
Test results of other AC 22 & AC 32
with other bitumen types, without RA



Durability e_6

AC 32 trag 45/80 RC, T2, G6, RA20

Test results of other AC 22 & AC 32
With different bitumen types, without RA



First test track in AT – Laßnitzthal
Current condition after 8 year in use

Map of projects for reuse of reclaimed asphalt on Highways and main roads 2010-2017

Map of projects for reuse of reclaimed asphalt on Highways and main roads 2010-2017

Test track in CZ – Lednice
OMV Starfalt PMB 45/80 RC used for binder

Location of the site:

Direct in Lednice

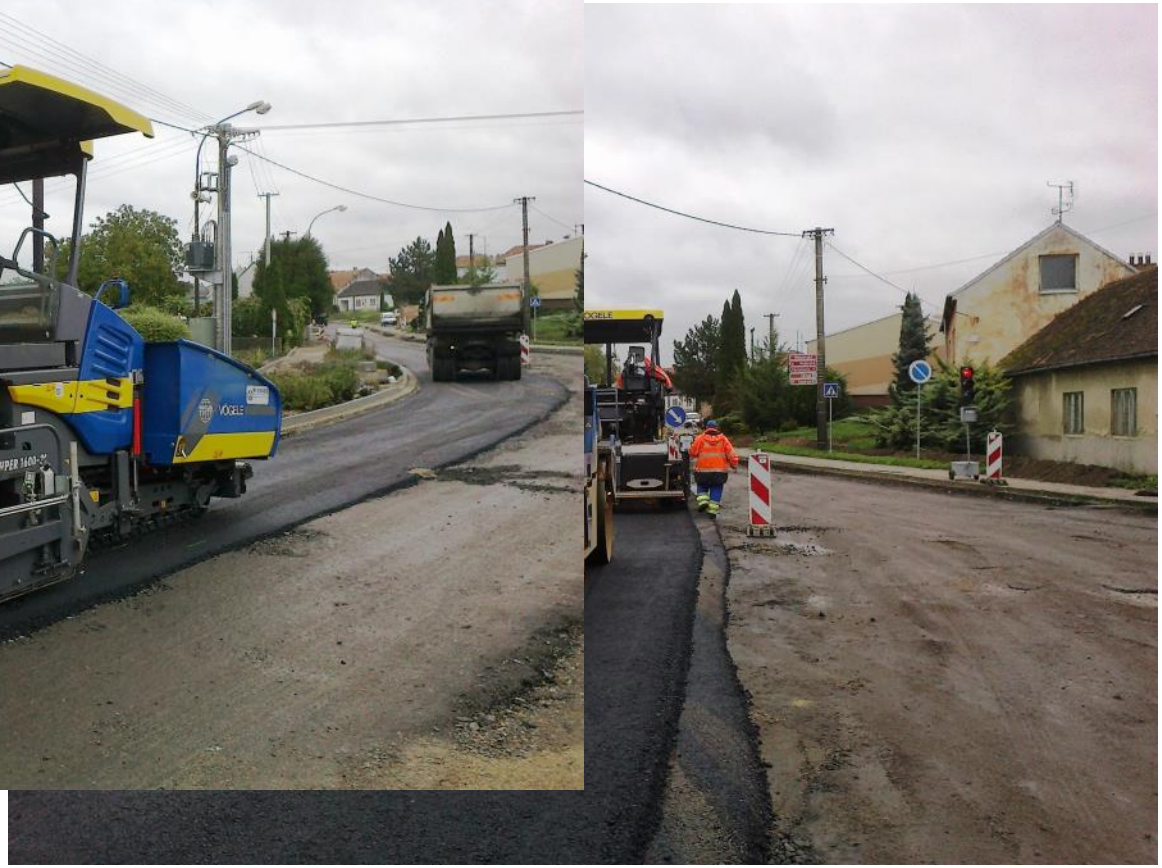
Length:	about 600 meters
Wide:	in total 6 meters
Thickness:	6 cm of base layer
Area:	about 3.800 m²

Asphalt: ACP 22 S PmB 45/80 RC s R

Recy. ratio: 20% reclaimed asphalt (cold adding)

Binder: OMV Starfalt PmB 45/80- RC

Test track in CZ – Lednice
OMV Starfalt PMB 45/80 RC used for binder



Test track in CZ – Domasov
OMV Starfalt PMB 45/80RC used for surface I.

Results TU in Vienna (Performance based tests):

Dyn. Stiffness test
4PB-PR (EN 12697-26):

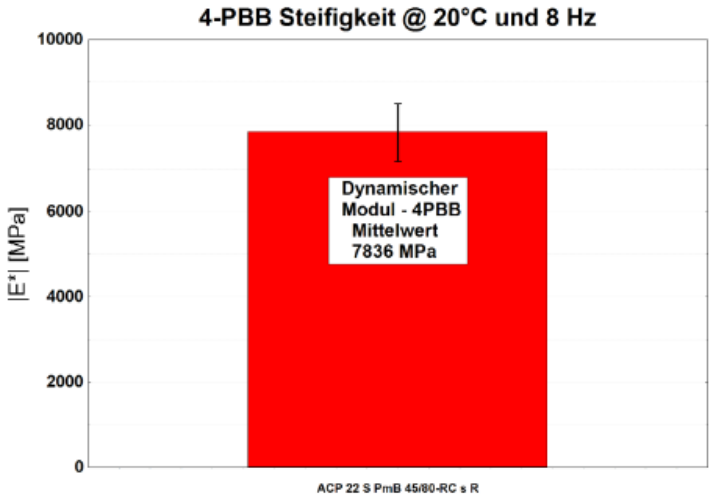


Abbildung 6: Dynamischer Modul – Mittelwert

Resistance against permanent deformation – TCCT (EN 12697-25):

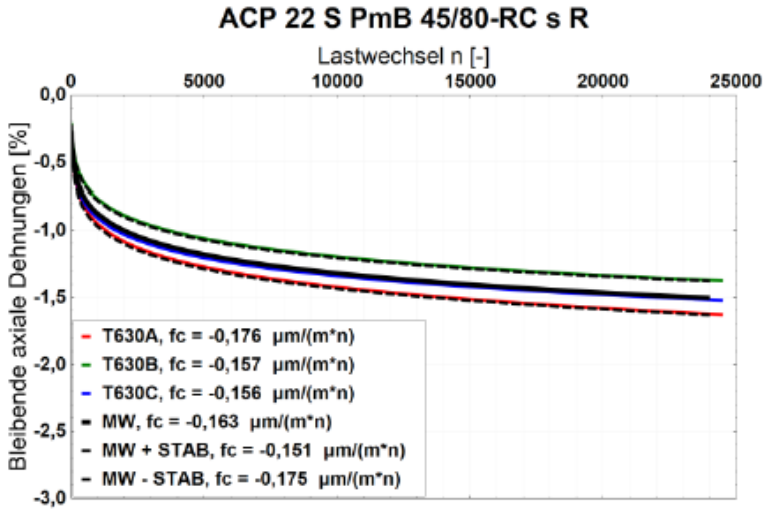
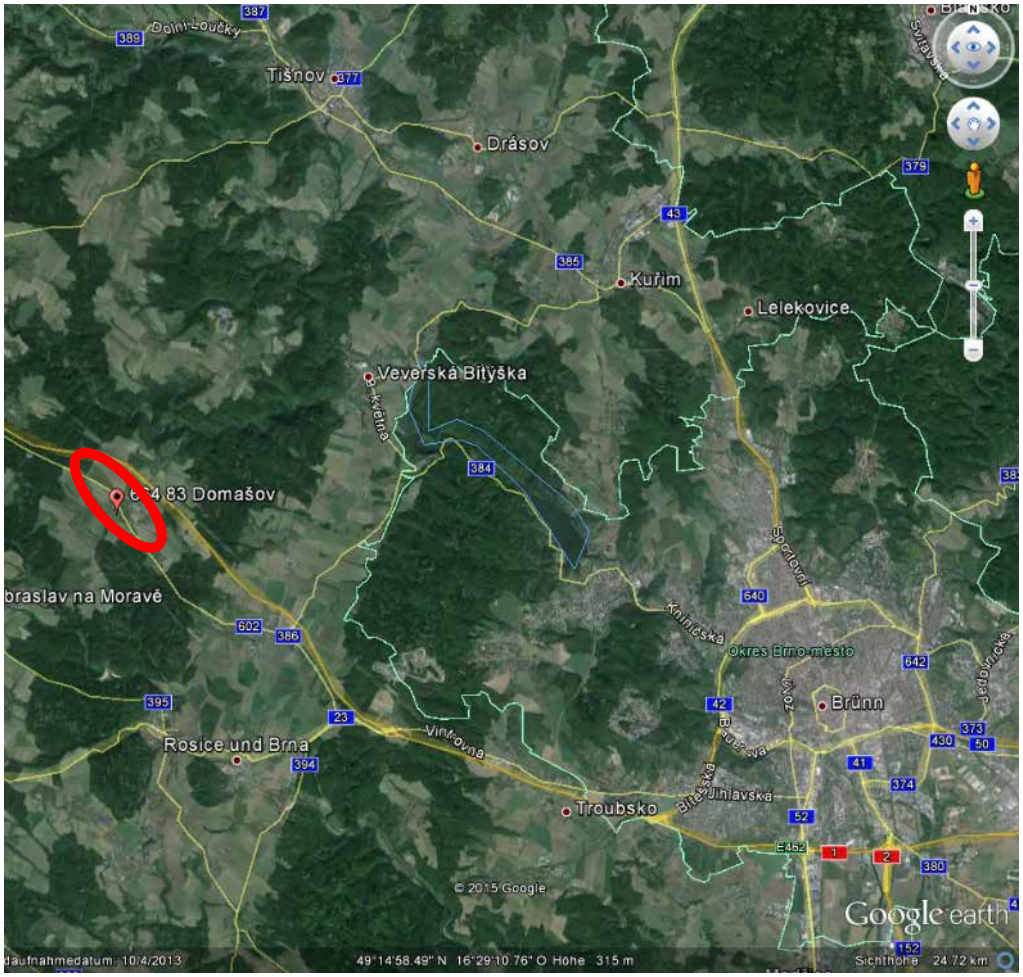


Abbildung 4: TCCT-Ergebnisse des ACP 22 S PmB 45/80-RC s R

Test track in CZ – Lednice after 3 winter in use

Test track in CZ – Domasov
OMV Starfalt PMB 45/80RC used for surface l.



Location of the site:

Reconstruction of the cross-town route in Domasov (road 602)

Length:	about 1,45 kM
Wide:	in total 7 meters
Thickness:	4 cm surface layer
Area:	about 10.150 m²
Asphalt:	ACO 11+
Recy. ratio:	15% reclaimed asphalt (cold adding)

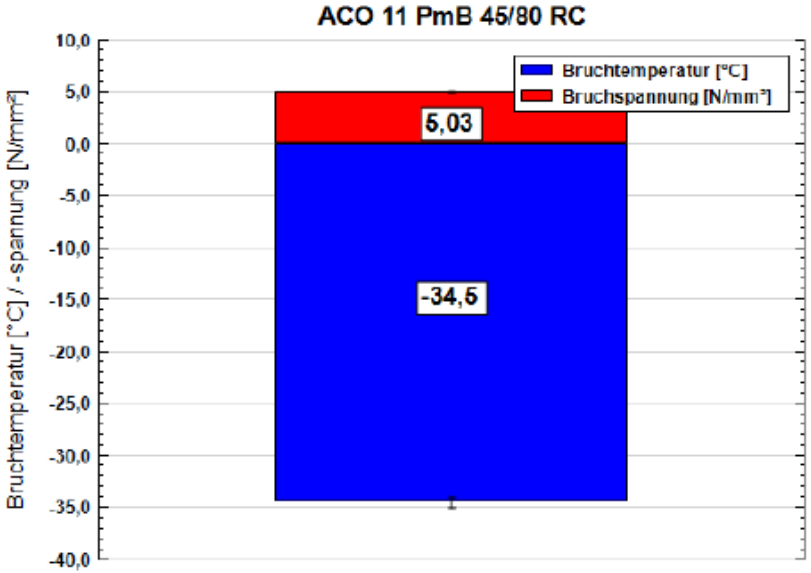
Binder:OMV Starfalt PmB 45/80- RC

Test track in CZ – Domasov
OMV Starfalt PMB 45/80RC used for surface I.

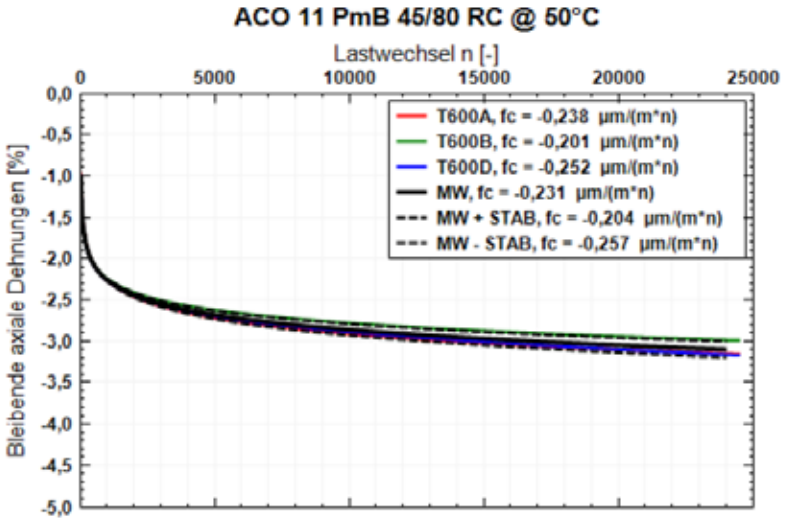
Test track in CZ – Domasov
OMV Starfalt PMB 45/80RC used for surface I.

Results TU in Vienna (Performance based tests):

Low temperature cracking TSRST (ON EN 12697-46):



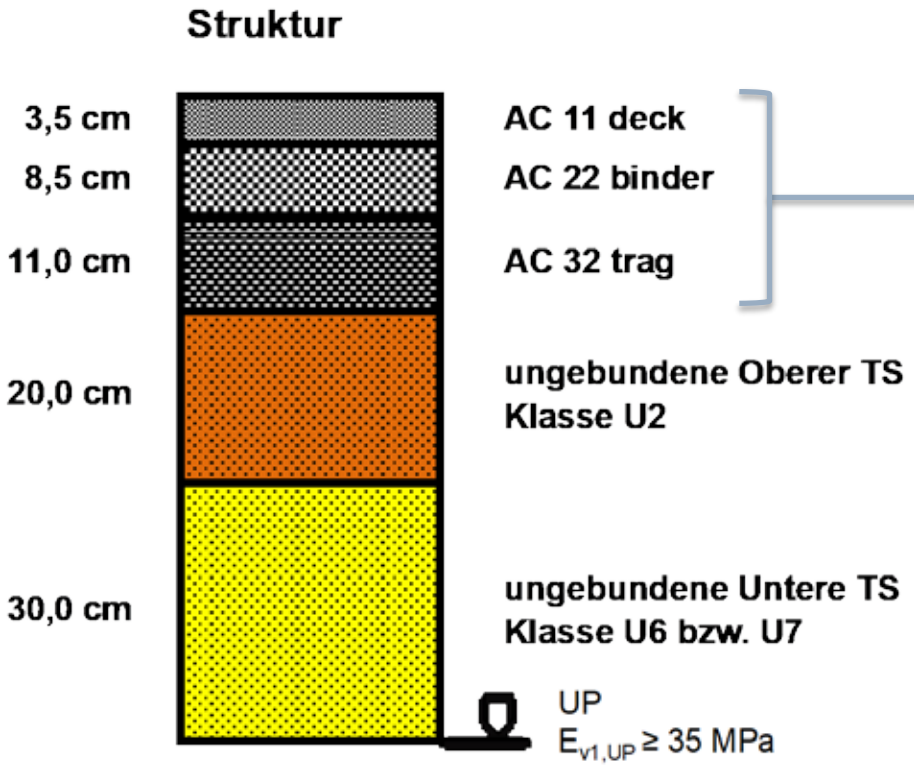
Resistance against permanent deformation – TCCT (EN 12697-25):



TCCT-Ergebnisse des ACO 11 deck 45/80 RC

Test track in CZ – Domasov after 3 winter in use

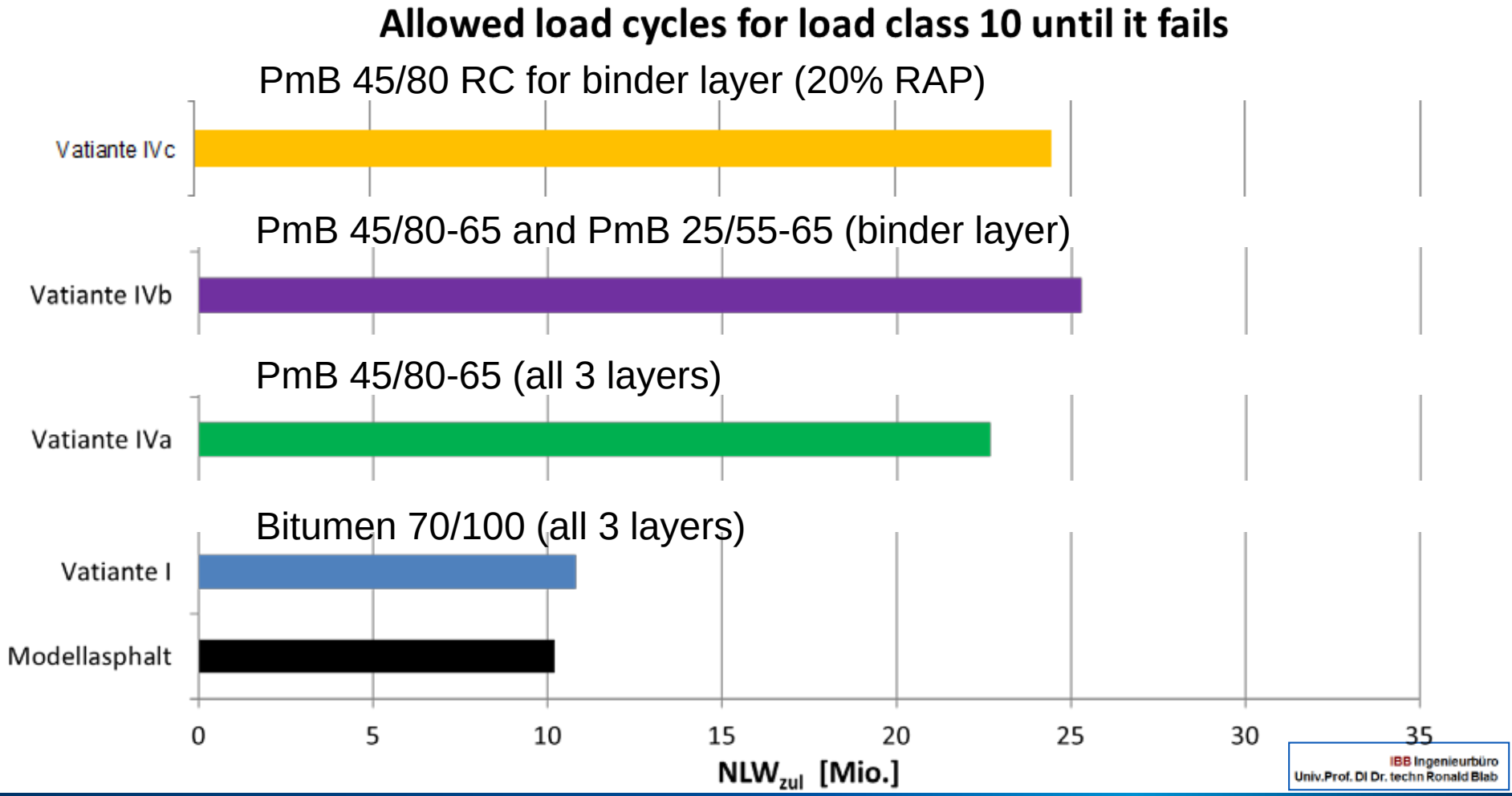
Pavement structure - highway load class 10



Bitumen

- Bitumen 70/100
- PmB 25/55-65
- PmB 45/80-65
- PmB 45/80 RC (+20% RAP)

Structural Life time – comparison with already existing calculation



Conclusions

- 9 years of experience with OMV RC Bitumen (100/150 RC or OMV Starfalt PmB RC)
- Commodity product in Austria – frequently used on highway rehabilitation
- Test tracks as well built in CZ and Slo
- High quality asphalt mixtures with excellent performance
- Data available for pavement design – performance proven
- Easy to use material for cold and hot recycling mixing plants

Next steps

- Research work already started with TU Brno
  - Quality control after 4 years in use – started already
  - Data available after installation, ½ , 1 and 2 years – stable good quality, no changes
- Quality control of first test track in Austria
  - Not agreed or started yet, but should be done this year
- Quality control of first test track in Slovenia
  - Not agreed or started yet, but should be done this year


7th E&E CONGRESS
EURASPHALT & EUROBITUME
MADRID 12-14 May 2020
Palacio Municipal de Congresos de Madrid
ASPHALT 4.0 FOR FUTURE MOBILITY
#eecongress2020
www.eecongress2020.org

CEE Road Pavement Design Workshop 2018
Next 2020

- 10 participating countries and 45 experts
- Improving road pavement design methods (new construction, reconstruction of layers, case studies, tunnels,…)
- Next Workshop in 2020
  - Common pavement design approach (research project)
  - Can it be used for new product evaluation?
  - Fatigue resistance? Fatigue at different temperatures?
  - …

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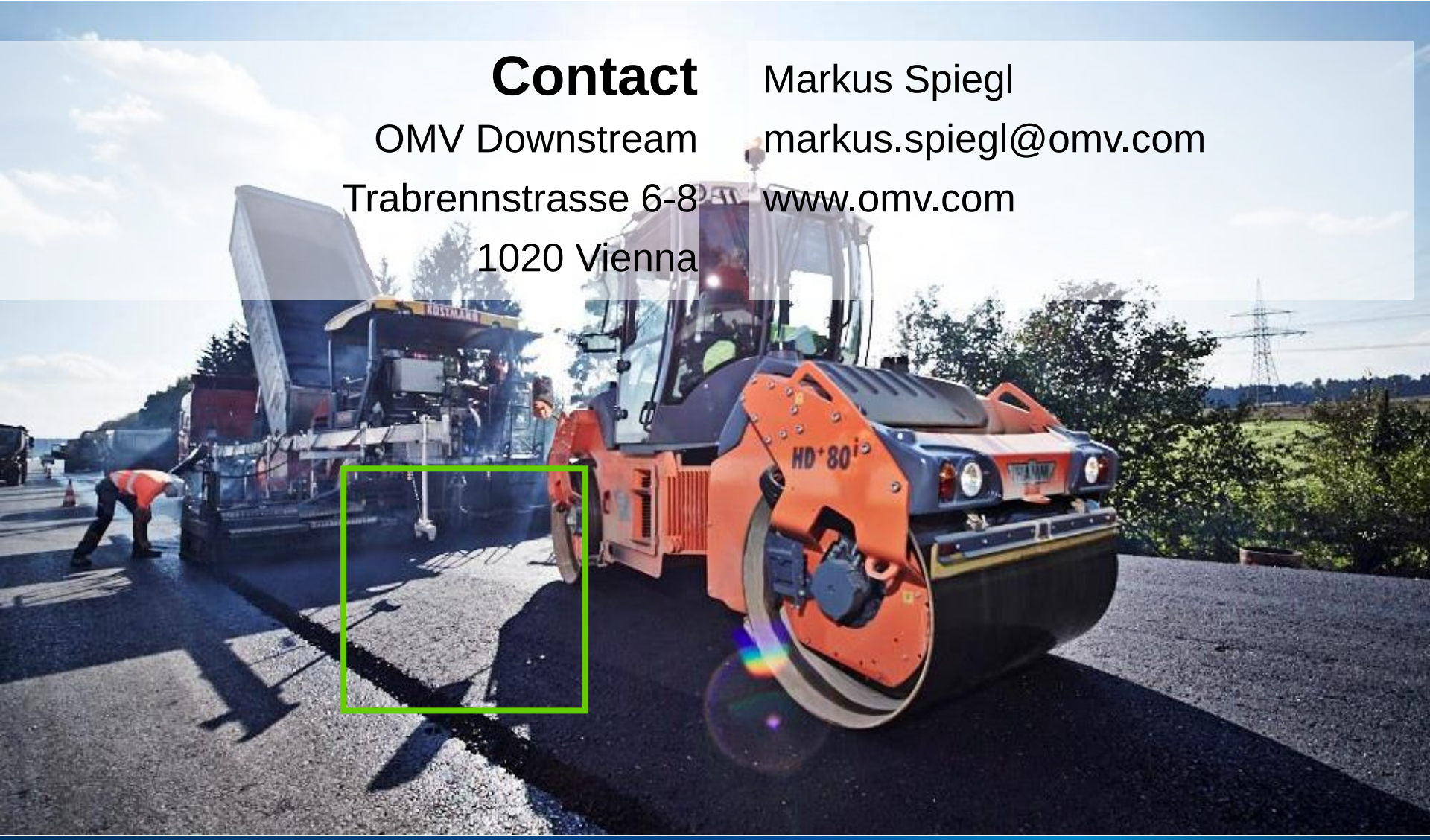

OMV STARFALT HIGH PERFORMANCE BITUMEN

Interchem

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