

HEALROAD Symposium

HEALROAD industrial upscaling and full scale demonstrator

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Mix design and testing (Task 5.1)

1. The HEALROAD mixtures, developed by Cantabria University UC, are translated by HEIJMANS to Dutch raw materials

 \rightarrow volumetric approach / high density of steel particles results showed the required Type Test properties

2. Ravelling test at the PA variant: Rotating Surface Abrasion test (RSAT)













Full-scale Asphalt production (Task 5.1)

Determining the correct mixing procedure in a asphalt production plant



Several mixing-variants, produced in an asphalt plant \rightarrow mechanical tests

- → No special and exceptional procedures are needed to produce the HEALROAD mixtures (15 sec longer mixing process)
- \rightarrow Standard production plant is suitable with the usual way of adding additives
- → Positive factor for the introduction of HEALROAD mixes in the European asphalt market











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test section on duraBASt







test-section on duraBASt (Task 5.2)









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test-section on duraBASt (Task 5.2)

• transport to duraBASt, laying and compaction



 \rightarrow special attention to temperature (no segregation) / compaction in the correct window









test-section on duraBASt (Task 5.2)



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test-section on duraBASt (Task 5.2)

- Accelerated Pavement Testing (APT)
 - Mobile Load Simulator MLS30
 - Super-Single (9.0 bar)
 4 loading wheels in closed chain
 - load = 75 kN
 speed = 7 km/h = 2000 cycles/h
 - lateral unite

±350 mm left and right (one whole program need approx. 12min)









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test-section on duraBASt (Task 5.2)

• time lapse video of loading









test-section on duraBASt (Task 5.2)

• time lapse video of loading









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test-section on duraBASt (Task 5.2)

- failure criteria = stone loss
- HEIJMANS laboratory test with RSAT
 - 4 samples laboratory production
 - 4 samples duraBASt production
- BASt used one loading area for healing actions (performed by SGS)
 - no healing at two samples
 - healing on four samples different moments







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test-section on duraBASt (Task 5.2)

- details to Induction machine
 - 1400 Volt
 - 312 kHz
 - 33 Ampere
 - Energy 7-7,5 kW
 - 40 cm Coil (2 pieces)
 - Condensators: 4 x 0,33 μF







test-section on duraBASt (Task 5.2)

- healing actions
 - temperatures



____20%_s2r ____40%_s3r ____60%_s1I ____80%_s2I







- details time lapse
 - two cycles
 - duration of study including inspection approx. 30min (here factor 40)



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test-section on duraBASt (Task 5.2)

- healing actions
 - temperatures



Infravation An Infrastructure Innovation Programme





- details time lapse
 - two cycles
 - duration of study including inspection approx. 30min (here factor 40)



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PAVEMENT PRESERVATION & RECYCLING SUMMIT

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test-section on duraBASt (Task 5.2)

• surface inspection



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An Infras	tructure In	novati	on Prog	ramme



dat o	gram	amount of stones	average weight of stone [gram]	stone loss progress (g/h)
02 x 17	5.5	33	0.17	0.64
ົ <mark>√ ∕</mark> ∠017	4.3	25	0.17	0.69
1 2017	_6_7 _	29	0.23	1.22
J7.11.2017	3.7	18	0.21	0.57
08.11.2017	1.5	 <u>14</u> 	0.11	0.29
09.11.2017	5	18	0.28	0.68
10.11.2017	1.6	12	0.13	0.29
13.11.2017	2.1	21	0.10	0.35
14.11.2017	1.1	12	0.09	0.16
15.11.2017	1.3	17	0.08	0.20
17.11.2017	5.8	17	0.34	1.05
Total	<u>38.6</u>	<u>216</u>	<u>0.18</u>	<u>0.56</u>
		IL STEED ones		0.92103



test-section on duraBASt (Task 5.2)

• surface inspection - RSAT



RSAT result	raveling -	initial	stone loss
	stone loss (g)	stone loss (g)	progress (g/h)
Slab 1	7.5	3.3	0.23
Slab 2	10.2	7.8	0.13
Slab 3	17.0	3.3	0.65
Slab 4	9.8	3.5	0.29
average	11.1	4.5	0.33







RSAT result	raveling -	initial	stone loss
	stone loss (g)	stone loss (g)	progress (g/h)
Cores Slab K1	9.6	1.6	0.34
Cores Slab K2	3.6	1.7	0.08
Cores Slab K3	9.7	0.1	0.38
Cores Slab K4	10.0	2.0	0.37
average	8.2	1.4	0.29
translation factor plates to cores	74 %	31 %	88 %



test-section on duraBASt (Task 5.2)

• surface pictures

HR2-s1r_37-7_sl-com – left picture after 0 % of loading / right picture after 60 % of loading





HR2-s2l_170+12_sl-par – left picture after 0 % of loading, middle picture after 20 % of loading, right picture after 100 % of loading















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Conclusion

- 1) full-scale demonstrator was paved with standard paving technology and without cluster or other local problems
- 2) APT program was performed for 150.000 loading cycles including surface inspections and surface pictures
- 3) no correlation between surface inspection and surface pictures to healing actions
 - a) short loading program for a good construction
 - b) low lateral movement speed
 - c) first full-scale APT program for this kind of topic (\rightarrow lesson learned)
- 4) laboratory research with full-scale mixed material (RSAT) and full-scale paved material before and after loading (RSAT)
- 5) further research are needed
 - a) more APT data for evaluation
 - b) detection of right moment for healing actions under real conditions









Thank you very much







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