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Runway pavement reconstruction with full material recycling: the case of the airport of Treviso

BOCCI Maurizio[1], MANGANARO Andrea[2], STRAMAZZO Virginio[3] and GRILLI Andrea[4]
[1]Università Politecnica delle Marche, Ancona, Italy – m.bocci@univpm.it
[2]SAVE Engineering SpA, Venice, Italy – amanganaro@veniceairport.it
[3]SAVE Engineering SpA, Venice, Italy – cvstramazzo@veniceairport.it
[4] Università degli Studi della Repubblica di San Marino, Republic of San Marino – andrea.grilli@unirsm.sm

Introduction

The airport of Treviso “Antonio Canova” (ICAO code: LIPH, IATA code: TSF) is classified as civil airport for national and international traffic. It is located about 3 Km south-west from the city of Treviso (Italy) and works in synergy with the airport of Venice Tessera. The approach for the rehabilitation project makes the airport of Treviso one of the most extended application of many recycling techniques.

Project development

In order to minimize the environmental impact, the rehabilitation project adopted several recycling techniques aimed to the full material recycling and considering the construction and demolition material and RA. The combination of above-mentioned factors and the need to maximize the daily production, forced to seek a new technical alternative using specific recycling techniques. Exploiting the RA (about 40,000 m^3), the crushed cement concrete (CCC) of the heads of the (25,000 m^3), the CCC from the old military runway (27,000 m^3), and the granular material of the foundation (13,600 m^3) the following pavement structure was considered:

- wearing course in HMA with SBS modified bitumen: 4 cm;
- binder course in HMA with SBS modified bitumen: 5 cm;
- base course in HMA with SBS modified bitumen: 8 cm;
- subbase course in stabilized RA with cement and bituminous emulsion: 18 cm;
- foundation course in cement stabilized reclaimed Materials (50% of CCC and 50% of RA): 20 cm;
- capping course in cement stabilized sandy gravel: 20 cm;
- subgrade in cement stabilized silty sand: 30 cm.

ITS and UCT values of recycled mixtures for the foundation course

Curing period: 2 days at 25°C		Curing period: 7 days at 25°C	
Cement dosage [%]	ITS [MPa]	UCS [MPa]	ITS [MPa]	UCS [MPa]
2	0.24	2.40	0.26	5.00
2.5	0.26	3.80	0.28	5.20
3	0.27	4.10	0.29	4.50
3.5	0.29	4.50	0.32	6.70
Specifications [MPa]	> 0.15	> 1.50	-	-

Mechanical performance for all CBTM series

Mixture	ITS [N/mm^2] Curing period [hours]		
	24	48	72
3C2.5E2F	0.23	0.27	0.50
2C3E2F	0.24	0.27	0.41
2C3E	-	-	0.38
1.5C3.5E2F	0.23	0.24	0.36
Specifications [N/mm^2]	-	-	> 0.35

Mixture	UCS [N/mm^2]	ITS [N/mm^2]	ITSM [MPa]
2C3E2F	2.90	0.37	3700
2C3E	2.44	0.37	3200
Specifications [N/mm^2]	-	> 0.35	> 3000

Average elastic modulus from backcalculation for each layers

RW07/25: +5 m	Elastic modulus, 20°C [MPa]				
Sub-section	E1, HMA	E2, CBTM	E3, subbase	E4, foundation	E5, subgrade
1	2705	3940	5685	635	301
2	4657	3247	6105	1160	300
3	3760	2471	4520	779	281
4	4725	3507	6753	1022	326

RW07/25: -5 m	Elastic modulus, 20°C [MPa]				
Sub-section	E1, HMA	E2, CBTM	E3, subbase	E4, foundation	E5, subgrade
1	3295	3049	8003	708	319
2	4718	3758	9055	1129	341
3	2903	2270	5631	683	286
4	5057	3847	9618	1022	349

Conclusions

This paper shows the application in airfield of scientific knowledge And practical experiences on pavement recycling developed in Italy for road maintenance projects. All recycled mixtures were tested in laboratory, however, the in situ experimentation by mean of trial sections was essential to validate the mechanical performance of mixtures and to determine the construction phases. The verification of the overall pavement structure through non-destructive in-situ Measurements with FWD established the definitive compliance to the design parameters.

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