IN SITU RECYCLING

+ cement

+ water

+ added aggregate
Evolution of Belgian realisations of in situ pavement recycling
COMPRESSIVE STRENGTH
(R'c - 90 d - on cores of 100 cm²)

- Vaux-sur-Sûre: 9,2 N/mm²
- Lavaux-Ste-Anne: 8,7 N/mm²
- Francorchamps: 13,5 N/mm² (on cores of 200 cm²)
- Philippeville: 17,9 N/mm²
- Messancy: 11,2 N/mm²
- Bierset: 12,1 N/mm² (on cubes of 20 cm)
- Waimes: 15,0 N/mm² (on cubes of 20 cm)
- Attert: 10,6 N/mm²
- Marche-en Famenne: 11,7 N/mm²
- Walloon Region: “RW 99” detailed + GUIDELINES

- Flemish Region: “sb250” briefly

- Brussels Region: “TB2000” only subgrade stabilisation
TECHNICAL PRESCRIPTIONS

CASE STUDY
Marche-En-Famenne
☐ Study of the history of the road & visual examination

☐ Cores or transverse trenches

thickness of bituminous layer max. 1/3

☐ Sieve analysis

※ max. 10 % aggregates > 80 mm
ON SITE MATERIAL COMPARED TO THE TALBOT CURVE

- Talbot curve
- On site material

Sieve sizes in mm

Retained in %

Passing in %

Material sizes:
- (0.09)
- (0.125)
- (0.18)
- (0.25)
- (0.35)
- (0.5)
- (0.71)
- (1)
- (1.40)
- (2)
- (2.8)
- (4)
- (5.6)
- (11.2)
- (16)
- (22.4)
- (31.5)
- (45)
- 63
## QUICK STABILISATION TEST

<table>
<thead>
<tr>
<th>Water content (%)</th>
<th>6</th>
<th>7</th>
<th>7,5</th>
<th>8</th>
<th>9</th>
</tr>
</thead>
<tbody>
<tr>
<td>Compressive</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>strength after</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>7 days (N/mm²)</td>
<td>13,0</td>
<td>21,0</td>
<td>20,8</td>
<td>15,5</td>
<td>17,5</td>
</tr>
</tbody>
</table>
6% CEM III/A 42,5

ADDED AGGREGATE:
0/32 CRUSHED LIMESTONE
## WATER CONTENT AND BULK DENSITY

<table>
<thead>
<tr>
<th></th>
<th>Average</th>
<th>Standard deviation</th>
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</thead>
<tbody>
<tr>
<td><strong>Water content (%)</strong></td>
<td>7.19</td>
<td>1.21</td>
</tr>
<tr>
<td><strong>Density (kg/m³)</strong></td>
<td>2370</td>
<td>33</td>
</tr>
</tbody>
</table>
### COMPRESSIVE STRENGTH (N/mm²)
#### ON CUBES 20x20x20 cm³

<table>
<thead>
<tr>
<th></th>
<th>Average</th>
<th>Standard deviation</th>
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<tbody>
<tr>
<td><strong>After 7 days</strong></td>
<td>12,56</td>
<td>6,3</td>
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<tr>
<td><strong>After 28 days</strong></td>
<td>20,1</td>
<td>9,5</td>
</tr>
<tr>
<td><strong>After 91 days</strong></td>
<td>24,9</td>
<td>11,8</td>
</tr>
</tbody>
</table>
THE ON SITE MATERIAL AND THE TALBOT CURVE

Sieve sizes in mm

Retained in %

Passing in %

(0.09) (0.125) (0.18) (0.25) (0.35) (0.5) (0.71) 1 (1.40) 2 (2.8) 4 (5.6) (11.2) 16 (22.4) 31.5 (45) 63

Talbot curve
On site material
THE ON SITE MATERIAL, ADDED AGGREGATE AND THE TALBOTT CURVE

- Added aggregate
- Talbot curve
- On site material

- Retained in %
- Passing in %

Sieve sizes in mm
Retreated material compared to the on site material and to the Talbot curve.
## COMPRESSIVE STRENGTH (N/mm²)
### AFTER FIVE MONTHS ON CORES 100 cm²

<table>
<thead>
<tr>
<th></th>
<th>Average</th>
<th>Standard deviation</th>
</tr>
</thead>
<tbody>
<tr>
<td>Upper parts</td>
<td>15,0</td>
<td>9,2</td>
</tr>
<tr>
<td>Middle parts</td>
<td>11,8</td>
<td>7,2</td>
</tr>
<tr>
<td>Lower parts</td>
<td>7,1</td>
<td>3,4</td>
</tr>
<tr>
<td>Mean of all samples</td>
<td>11,7</td>
<td>7,8</td>
</tr>
</tbody>
</table>
REFLECTIVE CRACKING
CONCLUSIONS

RECYCLING IN SITU =

MASTER RECYCLING TECHNIQUE

- STANDARD SPECIFICATIONS EXIST
- FUTURE ?
  - feasibility studies
  - innovating techniques - specific material
  - financial incentive ?
- PROMOTION
  - economical and ecological advantages