IN SITU RECYCLING USING CEMENT

THE BELGIAN EXPERIENCE

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SEMINAR ON ROAD PAVEMENT RECYCLING
10 TO 11 OCTOBER 2002
WARSAW (POLAND)

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-Sté-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
STANDARD SPECIFICATIONS IN BELGIUM

- Walloon Region: “RW 99” detailed + GUIDELINES
- Flemish Region: “sb250” briefly
- Brussels Region: “TB2000” only subgrade stabilisation

TECHNICAL PRESCRIPTIONS

CASE STUDY
Marche-En-Famenne
FEASIBILITY STUDY

- 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

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 strength after 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>

MATERIALS

- 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>
</tr>
</thead>
<tbody>
<tr>
<td>Water content (%)</td>
<td>7.19</td>
<td>1.21</td>
</tr>
<tr>
<td>Density (kg/m³)</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>
</tr>
</thead>
<tbody>
<tr>
<td>After 7 days</td>
<td>12.56</td>
<td>6.3</td>
</tr>
<tr>
<td>After 28 days</td>
<td>20.1</td>
<td>9.5</td>
</tr>
<tr>
<td>After 91 days</td>
<td>24.9</td>
<td>11.8</td>
</tr>
</tbody>
</table>

### The On Site Material and the Talbot Curve

- **Talbot curve**
- **On site material**

### The On Site Material, Added Aggregate and the Talbot Curve

- **Added aggregate**
- **Talbot curve**
- **On site material**

### Retrieved Material Compared to the On Site Material and to the Talbot Curve

- **Retrieved material**
- **Talbot curve**
- **On site material**
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
RECYCLING IN SITU = MASTER RECYCLING TECHNIQUE

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

CONCLUSIONS