ASSESSMENT OF THE TRAFFIC NOISE ON THIN LAYERS

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Introduction

• The knowledge on the environmental impact of the existing surface pavement layers is very limited, particularly for what respects to tyre/road noise of thin layers.

• Thin layers are at present time widely used as wearing course both in urban and rural roads either in road rehabilitation or in new roads.

• Especially in the north of Portugal, these thin layers incorporate in great extent rubberized asphalt due to environmental concerns and to their higher structural strength.
Introduction

- Dense asphalt concrete, stone mastic asphalt and surface dressings generate more noise

- Contrasting with double and single porous asphalt, thin layers and poro-elastic surfaces
Objective

- To compare the tyre/road noise ($L_{max}$) generated in roads with thin surface layers using the Statistical Pass-By Method
Testing and analysis methodology

- Selection of 9 surfaces
- Statistical Pass-By Method: measurement of the maximum A-weighted sound levels ($L_{A_{\text{max}}}$)
- Selection of cars and heavy vehicles
- For each vehicle category
  - Linear regression analysis of $L_{A_{\text{max}}}$ versus $\log_{10} (v)$
  - Calculation of $L_{A_{\text{max}}}$ at 3 reference speeds ($L_{\text{ref}}$): 50, 70, 90 km/h
  - Comparison of the results
# Surface characteristics

<table>
<thead>
<tr>
<th>Surface</th>
<th>Description</th>
<th>Max. aggregate size [mm]</th>
<th>Age [years]</th>
</tr>
</thead>
<tbody>
<tr>
<td>GGAR10-m</td>
<td>Gap Graded Asphalt Rubber (about 10% rubber over binder weight)</td>
<td>10</td>
<td>1</td>
</tr>
<tr>
<td>GGAR10-A</td>
<td>Gap Graded Asphalt Rubber (about 20% rubber over binder weight)</td>
<td>10</td>
<td>4</td>
</tr>
<tr>
<td>GGAR10-B</td>
<td>Gap Graded Asphalt Rubber (about 20% rubber over binder weight)</td>
<td>10</td>
<td>-</td>
</tr>
<tr>
<td>GGAR12</td>
<td>Gap Graded Asphalt Rubber (about 20% rubber over binder weight)</td>
<td>12</td>
<td>4</td>
</tr>
<tr>
<td>PA16</td>
<td>Porous Asphalt</td>
<td>16</td>
<td>5</td>
</tr>
<tr>
<td>DA16</td>
<td>Dense Asphalt</td>
<td>16</td>
<td>1</td>
</tr>
<tr>
<td>OGA15</td>
<td>Open Graded Asphalt</td>
<td>15</td>
<td>5</td>
</tr>
<tr>
<td>SS10</td>
<td>Slurry Surfacing</td>
<td>10</td>
<td>2</td>
</tr>
<tr>
<td>OTRA16</td>
<td>Open texture rubber asphalt</td>
<td>16</td>
<td>3</td>
</tr>
</tbody>
</table>
Surface texture

OGAR10-m
OGAR12
OGAR10
SS10
DA16
OGA15
PA16
Statistical Pass-By Method

- Microphone position
- Adjacent lane
- Median marking
- Test lane
- (shoulder)

Distance:
- > 20 m
- 7.5 m
- Median marking
- Central test lane
- > 20 m

www.irf2010.com
Analysis of the results

- Data examples
Noise level versus speed

- Slope of the curve LAmax versus log10 of speed for heavy and light vehicles
Noise levels at reference speeds for light vehicles

- LAmax for light vehicles at 50, 70 and 90 km/h
Noise levels at reference speeds for heavy vehicles

- LAmax at 50 and 70 km/h
Conclusions

• The noise dependency on speed is not the same for light vehicles as for heavy vehicles

• Thin layers seem to have a higher impact on noise reduction for higher speeds

• For light vehicles, thin layers have generally the best performance except for the one with positive texture (SS10)

• For heavy vehicles, no consistent conclusion may be drawn since thin layers have a similar behaviour to the thicker ones and provide both low and high noise levels