Quiet road surfaces

Eurocities - working group noise
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# Source distribution

<table>
<thead>
<tr>
<th></th>
<th>Rolling noise (%)</th>
<th>Propulsion noise (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Car @ 25 km/h</td>
<td>50</td>
<td>50</td>
</tr>
<tr>
<td>Car @ 70 km/h</td>
<td>90</td>
<td>10</td>
</tr>
<tr>
<td>Truck @ 25 km/h</td>
<td>20</td>
<td>80</td>
</tr>
<tr>
<td>Truck @ 70 km/h</td>
<td>50</td>
<td>50</td>
</tr>
</tbody>
</table>

- In urban areas cars dominate vehicle fleet
- In urban driving rolling dominates overall noise production
- > 80% of total environmental noise produced is rolling noise
Road surface type explains most of observed pass-by level difference

![Graph showing the relationship between S.P.B. level and vehicle speed for different road surface types. The graph includes points representing brushed concrete and drain asphalt 0/8, 80 mm thick.]
Rolling noise = road X tyre

• Tyre tread profile X road surface texture excite tyre structure
• Vibrating tyre structure radiates noise
• Rolling noise propagates over road surface (but also propulsion noise)

• Road surface type is decisive for ambient noise level
Road surface effect (rel. to DAC 0/16): cars between 40 and 70 km/h
Aspects of Quiet Road Surface Application in cities

• Magnitude of reduction
  – Depends on traffic speed
  – Depends on traffic composition

• Wear and durability
  – Free flowing or stop & go traffic
  – Straight driving or turning
  – Winter maintenance

• Costs vs. Benefits
Durability in N, SE and SF

- Trials in Finland and Norway not successful
  - service life <3 yr.
  - >4 dB level increase in 1 yr.
Durability in mainland Europe

- Trials partly successful
  - Very open wear quickly, especially at crossings
  - Partly open wear moderate (after 8 yrs still 50% functioning)
  - ≈ 4dB loss after 7 yrs.
Evaluation of reduction effect

• Takes into account:
  – Aging of reference surface
  – More frequent re-surfacing
  – Average over several cycles
Cost & benefits

• Costs of noise reducing road surfaces often higher than conventional road surfaces
  – Cost of construction is higher
  – Lifetime is less
  – More maintenance necessary

• Cost/benefit ratio still better than other noise reducing measures like façade insulation and noise barriers
Smooth road surfaces amplifies low noise tyre effect
Conclusion

• Low noise road surfaces valuable measure to reduce traffic noise
• In general positive C/B ratio
• Application shall be engineered with knowledge of limitations
• Win-Win with other noise reducing strategies; especially low noise tyres
Application for highways

• Will be presented next GRB
• By Wiebe Albers, chair of CEDR noise working group