Road Assessment and Monitoring

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Contents

Background
SPENS Work Package 2
WP 2.1 Traffic equivalency factors
WP 2.2 Road measuring techniques
WP 2.3 Systematic decision support for road rehabilitation
Concluding remarks
1. Background I.

Development of expressway network: from 0.07 km/km² to 0.25 km/km² (EU-15 average) by 2020. Poor condition of non-expressways → drawback in national economy, extra user costs, life quality, tourism. Co-ordinated efforts for clearing the quality backlog (e.g. Hungarian National Road Rehabilitation Programme for 2009-2020).
1. Background II.

PMS data needs → Performance related pavement monitoring: unevenness, surface distress, bearing capacity, skid resistance

High-speed and high-performance measuring devices
2. SPENS Work Package 2

WP 2 Road Assessment and Monitoring
WP 2.1. Traffic equivalency factors
6 sections, HVS, strain measurements, approximate results
WP 2.2 Road measuring techniques
Harmonisation of bearing capacity, unevenness, skid resistance measuring devices
WP 2.3 Systematic decision support for road rehabilitation
Flow chart based methodology for the selection of optimum intervention techniques
3. WP 2.1 Traffic equivalency factors I.

Goal: Estimation of traffic load equivalency factors for CEEC-pavement structures

Methodology: HVS-loads, reactions, calculation

Pavement structures: 6 variants (4 applicable for the exercise)
3. WP 2.1 Traffic equivalency factors II.

![Diagram showing traffic equivalency factors II.]

- AC_{50} - Asphalt Concrete 0-16 (B 50/70), 6 cm
- Gravel 0-32, 20 cm
- Rock Material Resistant to Freezing

- AC_{50} - Asphalt Concrete 0-11s (B 50/70), 4 cm
- Gravel 0-32, 20 cm
- Rock Material Resistant to Freezing
3. WP 2.1 Traffic equivalency factors III.

Diagram showing layers of materials:

- $\text{AC}_{\text{sur}}$: Asphalt Concrete 0-11s (B 50/70), 4 cm
- $\text{AC}_{\text{th}}$: Asphalt Concrete 0-22S (B 50/70), 6 cm
- Gravel 0-32, 20 cm
- Rock Material Resistant to Freezing

Same layers on the right side of the diagram.
3. WP 2.1 Traffic equivalency factors IV.

![Diagram of road layers with labels: SMA - Stone Mastic Asphalt 11s, 4 cm, ACw - Asphalt Concrete 0-22S (B 50/70), 6 cm, Gravel 0-32, 20 cm, Rock Material Resistant to Freezing, ACe - Asphalt Concrete 0-22S (B 50/70), 6 cm, Reinforced Grid made of Steel, Gravel 0-32, 20 cm, Rock Material Resistant to Freezing.]}
3. WP 2.1 Traffic equivalency factors V.
### Changes of load during fatigue test

<table>
<thead>
<tr>
<th>Structure</th>
<th>Number of passes using wheel load of</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>60 kN</td>
</tr>
<tr>
<td>1 and 2</td>
<td>0-293,000</td>
</tr>
<tr>
<td>3 and 4</td>
<td>0-49,760</td>
</tr>
<tr>
<td>5 and 6</td>
<td>0-50,000</td>
</tr>
</tbody>
</table>
3. WP 2.1 Traffic equivalency factors VII.

Response tests: 30-40-50-60 kN loads after 20 000 and 200 000 repetitions
No fatigue, just deformation
Also FWD-tests
Data analysis: repetition numbers $\rightarrow$ asphalt strains $\rightarrow$ critical strains (pavement design methodology) $\rightarrow$ critical repetition numbers $\rightarrow$ powers of wheel load ratio
3. WP 2.1 Traffic equivalency factors VII.

40/50 kN wheel load ratios (80/100 kN axle load ratios):

- Section 2: 1.95
- Section 3: 3.65
- Section 4: 2.10
- Section 5: 2.33

Acceptable preliminary results
4. WP 2.2 Road measuring techniques

Harmonisation of bearing capacity, unevenness, skid resistance devices
20 devices of 8 countries on test sections near Vienna.
(reference device for unevenness measuring test)
A certificate given to the participants after the exercise.
5. WP 2.3. Systematic decision support for road rehabilitation

Decision making methodology for pavement rehabilitation and upgrading, low volume roads, CEEC’s.

Flow-chart based methodology
Network level approach → project level one
Several examples (case studies)
6. Concluding remarks

Road assessment and monitoring: special role in NMS’s
Vital part of asset management
Co-ordinated effort of mainly CEEC’s experts
Considerable contribution to success by Swedish and Austrian experts
THANK YOU FOR YOUR KIND ATTENTION!