GUIDELINES ON A SYSTEMATIC DECISION MAKING METHODOLOGY FOR THE PAVEMENT REHABILITATION

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Condition of pavement structures
Project objective

• Preparing the methodology for simple determining of measures on roads with smaller traffic volumes
• Roads with less traffic volume = < 300 passages of 100 kN
• Participating countries: Poland, Slovakia, Czech Republic, Hungary and Slovenia
• The total length of roads in these countries is roughly 300,000 km
## Traffic loads in individual CEE countries

<table>
<thead>
<tr>
<th>Country</th>
<th>Motorways + main roads</th>
<th>Regional roads</th>
<th>Lokal roads</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>km</td>
<td>Daily ESAL 100 kN</td>
<td>km</td>
</tr>
<tr>
<td></td>
<td></td>
<td>&gt; 300 [%]</td>
<td>≤ 300 [%]</td>
</tr>
<tr>
<td>Slovenia</td>
<td>1.417</td>
<td>65</td>
<td>35</td>
</tr>
<tr>
<td>Slovakia</td>
<td>3.738</td>
<td>93</td>
<td>7</td>
</tr>
<tr>
<td>Czech Republic</td>
<td>6.805</td>
<td>94</td>
<td>6</td>
</tr>
<tr>
<td>Hungary</td>
<td>7.601</td>
<td>85</td>
<td>15</td>
</tr>
<tr>
<td>Poland</td>
<td>16.811</td>
<td>61</td>
<td>39</td>
</tr>
</tbody>
</table>
Questionnaire

Data on the road network
Traffic data with regard to the road network
- density, traffic loading
- total permitted weight
- permitted axle load etc.
Pavement management
- measurements and equipment: longitudinal and transverse roughness
- skid resistance
- bearing capacity and
- assessment of the pavement condition
Presentation of typical pavement structures for:
- flexible pavements and
- rigid and semi-rigid pavements

Selection of measures on pavements
- condition of the pavement
- traffic loading
- design period
- climate conditions
- bearing capacity of the base
- other

Structural design procedures
- theoretical procedure
- empirical procedure
- standardised procedure.
Assessment of the condition of pavement structures

- Longitudinal roughness
- Transverse roughness
- Skid resistance
- Load bearing capacity
- Assessment of the pavement condition
Assessment of the condition of pavement structures

Types of measurements:

Longitudinal roughness

\[ y = y_{ref} = y_{1} \ (\text{mm}) \]

\[ \text{MR} = \frac{1}{n-1} \sum_{i=2}^{n} \frac{r_{i}}{r_{i-2}} \ (\text{mm/m}) \]
Assessment of the condition of pavement structures

Types of measurements:

Transverse roughness
Assessment of the condition of pavement structures

Types of measurements:

Skid resistance
Assessment of the condition of pavement structures

Types of measurements:

Load bearing capacity
Assessment of the condition of pavement structures

Types of measurements:

Assessment of the pavement condition
Methodology for systematically determining measures

Pavement condition:
- skid resistance (SR)
- transverse evenness (RUT)
- surface defects (SD)
- longitudinal evenness (IRI)
- bearing capacity (BC)

1. SR
   - fair, poor, and very poor
     - Are there SD or RUT problems?
       - yes
         - Preliminary rehabilitation measure (Table 3) + Resurfacing
       - no
         - Resurfacing

2. RUT
   - fair, poor, and very poor
     - Are there SD or BC problems?
       - yes
         - Preliminary rehabilitation measure (Table 3) + Resurfacing
       - no
         - Resurfacing

3. SD
   - good, very good
     - SR and RUT good or very good?
       - yes
         - No action
       - no
         - milling of longitudinal unevenness

4. IRI
   - fair or better
     - in-depth local improvement required?
       - yes
         - local replacement of asphalt layers (preliminary patching)
       - no
         - Resurfacing
   - poor, very poor
     - Are there SD or BC problems?
       - yes
         - Preliminary rehabilitation measure (Table 3) + Resurfacing
       - no
         - Resurfacing

5. BC
   - inadequate
     - in-depth local improvement required?
       - yes
         - local replacement of asphalt layers (preliminary patching)
       - no
         - Strengthening
   - good, very good
     - Rehabilitation according to SD classification
   - very poor
     - No action

No action

Resurfacing

Overlaying

Strengthening, Reconstruction

Demand for each criterion
The condition of the pavement is as follows:

- Pavement type \(\text{(regional road)}\)
- Skid resistance \(\rightarrow\) very poor
- Transverse roughness \(\rightarrow\) good
- Condition of pavement \(\rightarrow\) at border
- Longitudinal roughness \(\rightarrow\) very good
- Load bearing capacity \(\rightarrow\) adequate
Pavement condition:
- skid resistance (SR)
- transverse evenness (RUT)
- surface defects (SD)
- longitudinal evenness (IRI)
- bearing capacity (BC)

**1. SR**
- Fair, poor and very poor
- Are there SD or RUT problems? yes
- No action

**2. RUT**
- Fair, poor and very poor
- Are there SD or BC problems?
  - yes
    - Preliminary rehabilitation measure (Table 3) + Resurfacing
  - no
    - In-depth local replacement of the pavement structure

**3. SD**
- Fair, poor, very poor
- SR and RUT good or very good?
  - yes
    - No action
  - no
    - Milling of longitudinal unevenness

**4. IRI**
- Fair or better
- Are there SD or BC problems?
  - yes
    - Preliminary rehabilitation measure (Table 3) + Overlaying
  - no
    - Resurfacing

**5. BC**
- Inadequate
- Additional local improvement required?
  - yes
    - Strengthening
  - no
    - Rehabilitation according to SD classification

**Demand for each criterion**
- Very good and good
- No action
The condition of the pavement is as follows

- Skid resistance → very poor
- Transverse roughness → poor
- Condition of pavement → very poor
- Longitudinal roughness IRI → very poor
- Load bearing capacity → inadequate
Rehabilitation procedures and reconstruction techniques

Improving surface characteristics

Resurfacing

Reinforcement
Rehabilitation procedures and reconstruction techniques

Improving surface characteristics

▪ Surface treatment
Rehabilitation procedures and reconstruction techniques

Improving surface characteristics

- Surface dressing
Rehabilitation procedures and reconstruction techniques

Improving surface characteristics
  - Thin-layered dressing
Rehabilitation procedures and reconstruction techniques

Resurfacing

- AC surf
- SMA
- PA
Rehabilitation procedures and reconstruction techniques

Reinforcement

- Asphalt layers AC bin + AC surf
- Unbound and bound:
- Recycling existing layers
CONCLUSION

The methodology is useful for all kinds of pavements, especially for low volume roads.

Translation in languages of participating countries is anticipated.

Use for the general network level; each country must provide appropriate procedures for the project level.