Pavement management system on a French toll network

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ASF network

- **Autoroutes du Sud de la France (South of France highways):**
  - private toll highways concessionary
  - longest toll highways network in France
  - 2,620 km of highways in service
  - about 61 millions square meters of pavements
Part of pavements in road maintenance

- Pavements take a great part for safety and comfort
- Pavements represent more than 50% of the budget for maintenance works

ASF has developed and set up a pavement management system:

- to optimize maintenance works
- to maintain the level of service
inventory
Inventory

- Essential for a good asset management
- Impossible to do a diagnosis if we do not have information about the existing pavement
- Necessary to update rigorously the database with a lot of precision

Portorož, Slovenia
Inventory

In the database are described all the pavement layers (construction and maintenance)
- Date
- Thickness
- Nature
- Detailed results of works

Portorož, Slovenia
Condition survey

- Condition survey defined by an intern policy
- Systematic condition survey every 3 years for the surface characteristics, realized with high speed multifunction devices
- Particular condition survey concerns structure characteristics
Condition survey

- Sideway force coefficient
- Macrotexture (equivalent of a sand patch test result)
Condition survey

AMAC®

- Longitudinal evenness
- Rutting
- Distresses
- Noise
Indexes calculation

- For each characteristic, the measure is compared to thresholds and classified according to different levels of service: A for a good level to E for a bad level.

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<thead>
<tr>
<th>Rutting</th>
<th>5 mm</th>
<th>8 mm</th>
<th>10 mm</th>
<th>15 mm</th>
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<tbody>
<tr>
<td>A</td>
<td>B</td>
<td>C</td>
<td>D</td>
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Indexes calculation

- Unitary indicators are crossed to obtain a specific index
- The specific indexes are then crossed to obtain a global index
- Main indexes
  - adhesion (macrotexture and skid resistance)
  - evenness (rutting and longitudinal evenness)
  - distresses
Indexes calculation

- **Marks calculation:**
  - Mark assigned to each level
  - Calculation of the mark for a section, a highway or the network according to the repartition of level of service

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<tr>
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<th>A</th>
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<th>C</th>
<th>D</th>
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<tbody>
<tr>
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<td>% (pi)</td>
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\[
\text{mark} = \sum_{i=1}^{5} v_i \cdot p_i
\]
inventory

condition survey

notation

scheduling

Medium and long term

Prediction models

construction

time

Portorož, Slovenia
Maintenance works scheduling

- The network is broken down into uniform sections according to their surface course (same nature of surface course and same date of works)
Maintenance works scheduling

Indexes and marks are calculated for each section of the network, to classify them.
Maintenance works scheduling

To program works for medium and long term, prediction models for sideway force coefficient and macrotexture have been developed according:

- Surface course nature
- Grading
- Traffic
### Maintenance works scheduling

- Works and budget needs are scheduled for long term (end of the concession, ...)
- Regularly updating with condition survey results

#### Uniform works sections

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<td>Longueur totale (km)</td>
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Works proposed

Budget for each year
Portorož, Slovenia

Medium and long term

- Inventory
- Condition survey
- Notation
- Scheduling
- Works study

Prediction models

Construction

Time
Works study

- The pavement management system is just a decision aid model
- Detailed study should be realized to analyze all the characteristics and to confirm the necessity of works
- Further investigations must be realized to define the nature of works (bearing capacity, core sample)
Medium and long term

- Prediction models

- Notation
- Scheduling
- Works study
- Condition survey
- Inventory

Construction

Works

Portorož, Slovenia
Follow-up of level of service

inventory → condition survey → notation → scheduling → works study

construction → works

Moyen et long terme

Lois d’évolution

notation → scheduling → notation → scheduling → notation → scheduling
Follow-up of level of service

- Comparison of the highways

- All the index for a highway or the network
Follow-up of level of service

- Evolution with time for an index

- Evolution of the marks with time for different indexes
Conclusion

Pavement management system allows the manager
- To define the most appropriated maintenance works
- To make sure that the maintenance works are realized when necessary
- To schedule and optimize the budget
- To follow the level of service and to make sure that it does not decrease specially the safety level
Thank you
for your attention