Australian study tour

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Division in charge of road asset management
Sétra
Summary

Sétra, CSEP and DGPI,
Structural design of pavement,
Performances of national road pavements

Contracts → Pascal ROSSIGNY
RAP → Anthony MATYNIA
WMA → Pauline SAINTE
Sétra

Technical service of the french Ministry of sustainable development for:

- Transport,
- Roads and bridges engineering
- Road safety.

It provides expertise, methodologies, guidelines as well as software and information systems.
Sétra

4 technical departments:

• CTOA, bridges,
• CSEP, infrastructures: safety, environmental issues, asset management,
• CSTM, transport and transport systems,
• CITS, computer science.
DGPI (1/2)

Road asset management division

*Objects* :
- Road water management,
- Earthworks,
- Pavements.

*Issues* :
- Pavement design, techniques for construction, reinforcing or maintenance,
- Asset management : assessment, auscultation, programming, continued viability,
- Materials (components, processing, implementation),
- Surface performances (skid resistance, evenness, noise, ...).
DGPI (2/2)

Transversal tasks:

- Assessment of national road network (without toll roads),
- Innovative techniques: check of performances,
- Reducing environmental impacts of road works,
- New one: sanitary impacts of road works.
Structural design of pavements
4 iterative phases:
• Subgrade and capping layer,
• Modeling effect of standard axle on entire structure,
• Fatigue behavior,
• Frost/thaw verification.
Structural design of pavements

4 iterative phases:

- Subgrade and capping layer:
  - Bearing capacity,
- Modeling effect of standard axle on entire structure:
- Fatigue behavior:
- Frost/thaw verification:
Structural design of pavements

4 iterative phases:

- Subgrade and capping layer:
  - Bearing capacity,
- Modeling effect of standard axle on entire structure:
  - Strain (bituminous) / stress (hydraulic) of base layers,
  - Vertical strain of subgrade,
- Fatigue behavior:

- Frost/thaw verification:
Structural design of pavements

4 iterative phases:

- **Subgrade and capping layer:**
  - Bearing capacity,

- **Modeling effect of standard axle on entire structure:**
  - Strain (bituminous) / stress (hydraulic) of base layers,
  - Vertical strain of subgrade,

- **Fatigue behavior:**
  - Number of standard axles during life of pavement,
  - Service level,
  - Strain or stress for 1,000,000 standard axles,

- **Frost/thaw verification:**
Structural design of pavements

4 iterative phases:

• Subgrade and capping layer:
  ▪ Bearing capacity,

• Modeling effect of standard axle on entire structure:
  ▪ Strain (bituminous) / stress (hydraulic) of base layers,
  ▪ Vertical strain of subgrade,

• Fatigue behavior:
  ▪ Number of standard axles during life of pavement,
  ▪ Service level,
  ▪ Strain or stress for 1,000,000 standard axles,

• Frost/thaw verification:
  ▪ °C*jours of a chosen winter.
Structural design of pavement

Road owners choices:

- Life,
- Service level,
- Reference winter,
- Minimum bearing capacity of capping layer.
National Roads Network (non toll roads)

Road owners choices:

- Life: 30 years
- Service level: very high (risk ~2%),
- Reference winter (exceptional),
- Minimum bearing capacity of capping layer (>120Mpa).
National Roads Network (non toll roads)

Historic goals in sixties/seventies:

• Traffic under all conditions:
  ▪ Winter protection,
  ▪ Good behavior under heavy goods vehicles,

• Huge amount of road works in a small time:
  ▪ Use of available aggregates and binders,
  ▪ Efficient industry.
National Roads Network (non toll roads)

Historic choices in sixties/seventies:

- Bound layers with low rate of binders and high compactness,
- high bearing capacity upon capping layer in order to have high compactness,
- high stiffness of the entire structure.
National Roads Network (non toll roads)

HGV Lane, date of the last reinforcing. Average 26 years (1986)

<table>
<thead>
<tr>
<th>Renforcement</th>
<th>Pourcentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sixties</td>
<td>3 %</td>
</tr>
<tr>
<td>Seventies</td>
<td>35 %</td>
</tr>
<tr>
<td>Eighties</td>
<td>19 %</td>
</tr>
<tr>
<td>Nineties</td>
<td>26 %</td>
</tr>
<tr>
<td>After 2000</td>
<td>17 %</td>
</tr>
</tbody>
</table>
National Roads Network (non toll roads)

HGV lane: observed age of wearing course

- 1% to 7% distribution across different age groups.