Maintenance integration into the Asset Management cycle

Nîmes and Montpellier bypass

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Summary

- Introduction

- Case study: methodology applied to the CNM project
  - Context of the project
  - Balance between « design & build » and « operation »
  - Strategy of maintenance

- Key performance indicators

- Lessons learned

- Questions
Introduction

- Asset management
- Maintenance
Introduction

CNM strategy

Define strategy on CNM:
- Future
- KPI

Asset management

Transform the CNM strategy into:
- Maintenance policy
- Balance between maintenance and regeneration

Evaluate changes in behavior of assets and components

Under financial and capacity constraints

Production

Plan resources
Perform maintenance and works
Update knowledge:
- Heritage
- Description and behavior of the components
Case study: CNM railway line
Case study: CNM railway line

- 60 kilometers of railway line between the end of HSL n°5 and Montpellier
- 20 kilometers of connection with existing network
- Freight train up to 120 km/h
- Passenger train up to 220 km/h (migration to 300 km/h possible)
Case study : CNM railway line

- 25 years contract (2012 -2037) with SNCF Réseau

- 4 missions :
  - Finance
  - Design
  - Build
  - Maintain (20 years)
Case study: CNM railway line

- Design and build
- Maintenance

Performing asset
Case study: CNM railway line

Design and build
- Optimize time of works
- Optimize materials
- Reduce costs of works

Strategy maintenance
- Add maintenance access
- Implement monitoring stations
- Improve supervision center
- Strengthen infrastructure monitoring
Case study: CNM railway line

Strategy maintenance
Maintainer requirements in July 2013:

“ The maintainer's strategy is to prioritize precontact maintenance ”

“ Anticipate breakdowns is a major challenge and must contribute to the achievement of KPI ”

“ Predictive maintenance is implemented using remote station monitoring systems ”
Case study: CNM railway line

CMMS

Planification

Monitoring

Gap & Failure management

Intervention management
Case study: CNM railway line

**One-site instrumentation**
- Sensors
- Survaig / Surtrack

**Remote monitoring**
- Signalling installations

**Monitoring**

**Security**
- Surveillance video
- Access control
- Fire detection

**Measures with vehicles**
- Auscultation by US
- Rail grinding train

WIN *
Case study: CNM railway line
Case study: CNM railway line
Case study: CNM railway line
Case study : CNM railway line

- WIN characteristics
  - Geolocation-based data
  - Contactless measures
  - Acquisition system at 80 km/h

- Data processing
  - Back office
  - Partnership with Microsoft (AI)

- Video recording and geometrical measures
  - By day and by night
  - Track geometry
  - Catenary geometry
  - Signalisation *
Case study: CNM railway line

- Video analysis
Case study: CNM railway line

- Geometry analysis
Case study : CNM railway line
Key performance indicators

- Contractual KPI with SNCF Réseau
  - Reliability: (number of incident per year)
  - Availability: (average repair time for each incident)
  - Regularity: (sum of train delays divided by kilometers traveled)
  - Confort: (quality geometry of the track)
  - Heritage conservation: (quality of bridges)
  - **Quaterly report**: (synthesis activities over the period)

- Other KPI
  - SAP: (minutes lost / 100 kms)
## Key performance indicators

<table>
<thead>
<tr>
<th>KPI</th>
<th>Aim of the contract</th>
<th>Realised in 2018</th>
</tr>
</thead>
<tbody>
<tr>
<td>Availability</td>
<td>&lt; 140 min</td>
<td>131</td>
</tr>
<tr>
<td>Regularity</td>
<td>&lt; 3.00 min / 1000 kms</td>
<td>2,34</td>
</tr>
<tr>
<td>Reliability</td>
<td>&lt; 30 incidents</td>
<td>35</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Minutes lost / 100 kms</th>
<th>Historic Network</th>
<th>CNM</th>
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<table>
<thead>
<tr>
<th>Type of line</th>
<th>HSL</th>
<th>Alternative route of CNM</th>
<th>CNM</th>
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<tbody>
<tr>
<td>Availability rate of the line (at least 1 trafficable lane)</td>
<td>75%</td>
<td>84 %</td>
<td>94 %</td>
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</tbody>
</table>
Key performance indicators
Leassons learned

- During « design & build » phase, make the maintainer responsible by allocating a budget in order to limit interfaces and increase efficiency

- Anticipate very soon recruitment of maintenance teams:
  - Develop synergies with the constructor and operationnal teams of SNCF Réseau
  - Appropriate the infrastructure before begining of operation

- Think and work with a global vision system

- Don’t be afraid to innovate even if resistance to change is strong
Thank you for your attention

Questions?

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