Maintenance Activities: Risk Management

CFL Cargo / Ateliers de Pétange
Geoffrey TRESONTANI, November 2013
History of Ateliers de Pétange

1869
Creation of railway company
*Prince Henri*

1903
Construction of workshop for locomotives & parts manufacturing

1913
Construction of wagon workshop

1946
Establishment of railway company « Société Nationale des Chemins de Fer Luxembourgeois »
*CFL*

1981
Warehouses & part of workshop destroyed by fire
=> construction of modern infrastructure

2006 – 2007
Liberalisation of rail freight in Europe

October 2006
Establishment of rail freight company
*CFL Cargo*

February 2008
Integration of rail freight wagon workshop Ateliers de Pétange into CFL cargo Group
CFL cargo Group

ATIELIERS DE PETANGE

66.7%

33.3%

100%

CFL cargo Danmark

100%

CFL cargo Deutschland

100%

CFL cargo France

100%

CFL cargo Sverige

99%

Ateliers de Pétange
Ateliers de Pétange in figures

- Total area: 135,000 m²
- Covered area: 16,000 m², spread out over
  - 3 workshops
  - 1 administrative building
  - 1 warehouse with more than 6,000 spare parts
- 5,600 m outdoor rail tracks, for up to 250 wagons
- 1,300 m indoor rail tracks
- 34 switches
- 1 rail-road vehicle & 1 locomotive
- 1 van & 1 service truck for Mobile Service Team
- ~140 employees
- 13 MEUR of revenue
Workshop presentation

Specializations:

- Maintenance and repair of rail freight wagons (corrective and preventive)
- Maintenance of wheelsets
- Maintenance of brake systems
- Technical management of wagon fleets

Certifications as:

- Entity in Charge of Maintenance
- Maintenance Delivery Function according to EU regulation 445/2011

Central & strategic position at the heart of Europe
Risk Management
What is a hazard?

Something that has the potential to cause harm to people, property or the environment.

What is a risk?

A “risk” is the chance or probability of that hazard causing harm, loss or damage to people, property or the environment.

What is a control?

A control is a mechanism or process that minimises the risk of the hazard becoming actual so protects people, property or the environment from the identified hazard.
Risk Management Principle

Basic cycle / Complete Cycle

1. **Identify**
   - Define the context and issue
   - Identify hazards associated with the activity, task or change

2. **Assess**
   - Assess potential impacts of risks (probability, gravity)
   - Evaluate existing controls

3. **Treat or Avoid**
   - Define the controls required to avoid/reduce the risk
   - Engage the actions to set control on field

4. **Monitor and Review**
   - Record and report remaining risks
   - Monitor and review risk level after actions

5. **Define the context and issue**
   - Monitor and review risk level after actions
Risk Management Principle

Identify : main steps

Define the context and issue

- Change (structure, business, means, people…)
- Return of experience, Learning from event (accident or incident)
- Regulation change (new rules, criterias, restriction…)

Identify hazards due to the activity, task or change

- Incident report forms
- Self-Inspection Checklists
- Process and field audits
- Results of statistical process control
- Observation & consultation
- Regular maintenance checks
- Specialists assisting with specific issues in the workplace
- Knowledge sharing
Risk Management Principle

Assess : main steps

**Assess potential impacts of risks (probability, gravity)**

- Analyse statistical database available for occurrence
- Estimate probability if there are no statistics
- Estimate severity of the consequences resulting from the hazard (fatalities, cost, image loss … prison term)
- Define the acceptance level and the chosen referential (best practices, similarity, self-defined)

**Evaluate existing controls**

- Analyse risks identified vs established controls
- Estimate efficiency of existing controls vs acceptance level
- Define the existing control that have to be upgraded or improved
- Define risks not covered by controls
Risk Management Principle

Treat or Avoid : main steps

Define the controls required to reduce/avoid the risks

- Evaluate the solutions available to treat or avoid risks
- Estimate the risks reduction level for the selected controls
- Set the control
- Adjust the control if it does not reach the risk reduction expected

Engage the actions to set control on field

- Allocate the requested means (human, financial, technical...)
- Plan the implementation and monitoring phases
- Implement the control on the field
- Check the risk level reached
- Improve or upgrade the control if the expected level is not reached
Risk Management Principle

Monitor and Review : main steps

Record and report remaining risks

- Establish hazard log
- Communicate about risks to the concerned stakeholders (board, staff …)

Monitor and review risks after actions

- Define the « monitoring » process : tasks, frequency and responsibilities
- Define the « review » process : tasks, frequency and responsibilities
- Integrate « Monitor and Review » into the management system (procedures)
- Re-assess risks level and re-engage the cycle …
Risk Management : Examples

Risk management in Ateliers de Pétange:

- Risk Management System formalised in procedure based on CSM

- Integrated into the Quality Management System (ISO9001)
Risk Management: Examples

Risk management methods used in Ateliers de Pétange:

→ Change / Incident:

Standard Risk Analysis based on return of experience, available information, maintenance referentials …

→ Maintenance activities:

• Interview
• Field inspections and analysis
• FMEA

→ Human factors:

• Analysis of working conditions and organisation risks
Risk Management: Examples

Risks due to change or incident: Standard Risk Analysis

- Analytical method
  - Define context/issue
  - Identify hazards
  - Assess potential impact
  - Evaluate existing control/situation
  - Define required actions
  - Report risks
  - Monitor and review

Analytical method:

1. Define context/issue
2. Identify hazards
3. Assess potential impact
4. Evaluate existing control/situation
5. Define required actions
6. Report risks
7. Monitor and review

Examples:

- Define context/issue
- Identify hazards
- Assess potential impact
- Evaluate existing control/situation
- Define required actions
- Report risks
- Monitor and review

Conclusion/Actions:

Based on this analysis, we recommend the application of the tram maintenance plan for the axles of the car wagons. The AP is responsible for maintaining the tram.

Example:

If an axle aged 55 years necessitates a 152 intervention, it is replaced. If an axle aged 47 years necessitates a 153 intervention, it is replaced. The latest intervention measures are effective within the tram's operation. New axles are added to the tram, and the tram is divided.

For the axles utilized in the tram, we recommend the implementation of a 103 generalization (replacement of the tram's axles) to maintain the tram's operation. New axles are added to the tram, and the tram is divided.
Risk assessment: Interview of operators

- Identification and assessment by the staff and operators about the risks due to their own tasks
Risk Management: Examples

Identify the hazard, Assess the risks

→ Identification and assessment by the staff and operators about the risks due to their own tasks

Questions (yes/no + explanations):

1. Can we execute a task in a non-compliance with the instructions?
2. Can we forget to do a task?
3. Can we mount or use an inappropriate component or inappropriate material?
4. Can we use or mount in a wrong way a component or material?
5. Can we damage the elements involved during the delivery of the task?
6. Can we damage peripheral elements during the delivery of the task?
7. Can we use the wrong maintenance rules when performing the task?
8. Can we assign tasks to unskilled people?

For each question, the staff has to assess the frequency of the potential issue

→ Negligible / Significant / Rare / Common / Permanent

For each question, if an error can be done, the staff have to define if there is a control and explain how and when.
Risk Management: Examples

Identify the hazard, Assess the risks, Treat/Avoid and Review

- Identify and assess by on-site audit + FMEA type analysis

Assessment principle: Probability x Gravity x Control
## Risk Management: Examples

**Define, Identify …**

### Table: Maintenance des essieux

<table>
<thead>
<tr>
<th>N°OP</th>
<th>Opérations</th>
<th>Description</th>
<th>Type tâche</th>
<th>IS1</th>
<th>IS2</th>
<th>IS3</th>
<th>Danger</th>
<th>Risque</th>
<th>Consequence (ultime)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Transfert essieu parc essieux vers atelier</td>
<td>Transfert du parc de stockage vers l'atelier avec chariot élévateur équipé de support en vactivité pour levage des essieux et dépose sur voies intérieures</td>
<td>Transfert</td>
<td>x</td>
<td>x</td>
<td>x</td>
<td>Endommagement arbre essieu, roue, boîte d'essieu</td>
<td>Chute, choc</td>
<td>Déraîlement (casse essieu, boîte chaude …)</td>
</tr>
<tr>
<td>2</td>
<td>Démontage couvercle de boîte d'essieu</td>
<td>Essieu poussé manuellement sur les voies intérieures jusqu'au poste de levage puis dévisage avec cli à chocs des vis de blocage du couvercle</td>
<td>Intervention</td>
<td>x</td>
<td>x</td>
<td>x</td>
<td>Endommagement couvercle et/ou boîte (déformation, fissure)</td>
<td>Chute, choc, désalignement</td>
<td>Déraîlement (casse essieu, boîte chaude …)</td>
</tr>
<tr>
<td>3</td>
<td>Extraction roulements</td>
<td>Roulement extrait soit après chauffage par induction, soit par avec extracteur pneumatique et injection d'huile sous pression</td>
<td>Intervention</td>
<td></td>
<td></td>
<td>x</td>
<td>Endommagement tissu essieu et roulements</td>
<td>Mauvais alignement, effort inadapté chute après démantèlement</td>
<td>Déraîlement (casse essieu, boîte chaude …)</td>
</tr>
</tbody>
</table>
**Assess, Evaluate existing controls**

<table>
<thead>
<tr>
<th>MILIEU</th>
<th>METHODE</th>
<th>MAIN D'OEUVR</th>
<th>MATIERE</th>
<th>MOYEN</th>
<th>CODE PRATIQUE</th>
</tr>
</thead>
<tbody>
<tr>
<td>Conditons climatiques (verglas, salage)</td>
<td>Inspection lors des operations en aval</td>
<td>Instructions de travail, gestion des competences et qualification operateur + inspection en cours de traitement essieu+formation</td>
<td>Equipement conforme, adapte et controle</td>
<td>Formation coriste AP</td>
<td>10 40 0,05 20 30</td>
</tr>
<tr>
<td>Inspection lors des operations en aval</td>
<td>Instructions de travail, gestion des competences et qualification operateur + inspection en cours de traitement essieu+formation</td>
<td>Equipement conforme, adapte et controle</td>
<td>IS21</td>
<td>10 40 0,1 40 30</td>
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<tr>
<td>Inspection lors des operations en aval</td>
<td>Instructions de travail, gestion des competences et qualification operateur + inspection en cours de traitement essieu+formation</td>
<td>Equipement conforme, adapte et controle</td>
<td>IS21+SKF</td>
<td>7 40 0,05 14 30</td>
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</table>
**Risk Management: Examples**

**Treat or Avoid, Review the risks**

<table>
<thead>
<tr>
<th>TREAT or AVOID</th>
<th>REVIEW</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Plan d'action</strong></td>
<td><strong>Cotation après amélioration</strong></td>
</tr>
<tr>
<td>Mise en place tapis caoutchouc au sol</td>
<td>BS/CL</td>
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</tbody>
</table>
Risk assessment: Human factors

- Identification and assessment by the management of the risks due to working conditions and organisation

### RISK MANAGEMENT: HUMAN FACTORS

(Extract from JAA JAR145 AVIATION MAINTENANCE HUMAN FACTORS)

<table>
<thead>
<tr>
<th>Elements</th>
<th>Non-Applicable</th>
<th>0%</th>
<th>25%</th>
<th>50%</th>
<th>75%</th>
<th>100%</th>
<th>Remarque</th>
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<tbody>
<tr>
<td>1- Safety Culture</td>
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<td>✅ Key Elements Contributing to a Good Safety Culture</td>
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<td>• Support from the top</td>
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<td>• Formal safety policy statement</td>
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<td>• Awareness of the safety policy statements</td>
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<td>• Practical support to enable the workforce</td>
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<td>• Learning culture and willingness</td>
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<td>• Corporate and personal integrity</td>
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<td>Point AP + Pi sécurité ferroviaire</td>
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<td>2- Maintenance Organisation Safety Policy</td>
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<td>✅ Examples of items which should be listed</td>
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<td>• Human factors training procedure</td>
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<td>Job description en cours mais il manque une</td>
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<td>matrice de responsabilités</td>
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<td>À expliciter - faire des points de focus</td>
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<td>Relève de poste &quot;officielle&quot; qui contient de la</td>
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<td>Remisée des informations mais pas formalisée</td>
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<td>3- Human factors program</td>
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<td>✅ Key elements of a human factors program</td>
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<td>• A company policy on human factors</td>
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<td>• Human factors training (of all personnel,</td>
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<td>• Reporting, investigation and analysis</td>
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<td>• Checking procedures for reporting of</td>
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<td>• Human factors and ergonomics audit/Line</td>
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<td>Operation Safety Audits (LOSAs) (of</td>
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<td>workplaces, lighting, noise, testing,</td>
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<td>• Technical manual, procedures,</td>
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</tbody>
</table>

- 100% indicates the highest level of importance.

- X indicates the level of importance for each element.
## Risk Management: Examples

Report the risks

### Analyse de risques: Synthèse par activité de maintenance

<table>
<thead>
<tr>
<th>Atelier</th>
<th>Activité</th>
<th>Non-conformité aux instructions</th>
<th>Cubil d'une tâche</th>
<th>Utilisation composant insuffisant</th>
<th>Mauvaise montage ou mauvaise utilisation composant ou matériau</th>
<th>Endommagement du composant</th>
<th>Endommagement d'un élément périphérique</th>
<th>Utilisation mauvaise référentiel</th>
<th>Personnel non qualifié pour l'exécution de la tâche</th>
<th>Moyenne FxP</th>
</tr>
</thead>
<tbody>
<tr>
<td>PM1</td>
<td>Reprofilage</td>
<td>0,3</td>
<td>3,0</td>
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<td>3,0</td>
<td>1,5</td>
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<td>1,2</td>
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<td>RP</td>
<td>1,5</td>
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<td>PM1</td>
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<td>1,4</td>
<td>1,5</td>
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<td>0,3</td>
<td>0,1</td>
<td>0,8</td>
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<td>PM5</td>
<td>Révision des composants de frein</td>
<td>0,3</td>
<td>0,3</td>
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<td>0,3</td>
<td>1,0</td>
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<td>PF1</td>
<td>Ressorts</td>
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<td>Vaisses de pesée</td>
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Risk Management : Examples

Report the risks

- Explain to the employees examples of freight cars accidents due to maintenance’s failure

2010 - Accident de Neufchâteau

Bilan accident :
➢ Dérailement 3 wagons citernes
➢ Pollution par fuite de phénol
➢ 600m de voies endommagées

Événement déclencheur :
➢ Rupture corps de roue

Cause primaire :
➢ Fissuration lente du corps de roue liée à un défaut de construction
Risk Management: Examples

Report the risks

- Technical Failure

2010 - Accident de Neufchâteau

Rupture du corps de roue sur wagon à l’origine du déraillement

Essieu déposé

Partie arrachée

Essieu sur wagon

photo 1 : fissure sur le côté de la roue

Ménetoscopie de toile de roue présentant le même défaut
Engaging a Risk Management System requires:

1. Involvement of all actors
2. Use of a methodological approach appropriate to the type of risk
3. Allocation of the requested people in front of the requested skills
4. Long term deployment with involvement of the management
5. Continuous communication between involved actors
Risk Management : Conclusion

Thanks for your attention !!!