Demand on Monitoring of Safety relevant Parameters according to European Regulation

Zilina
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Andreas Schöbel
Institute of Transportation
Research Center for Railway Engineering, Traffic Economics and Ropeways
Vienna University of Technology
http://www.eiba.tuwien.ac.at
Karlsplatz 13 / 230-2
Vienna, 1040
Annex III of directive 2008/57/EC:
- specifies the essential requirements on interoperability:
  - Safety
    - design,
    - construction or assembly,
    - maintenance and
    - monitoring
  of safety-critical components
Cause-Consequence-Chain

cause 1
cause 2
...
cause n

consequence 1

cause n+x

consequence m

indicator 1
...
indicator p

monitoring
onboard wayside
| Cause | Hot Box | Blocked Brake or Wheel | Faulty Elements of Brake System | Faulty Axle | Broken Wheel | Faulty Running Surface/Wheel Spot | Faulty Suspension and -component | Faulty Frame | Overload (continuous) | Violation of Clearance Gauge | Faulty Car Opening (Doors, Loading Trap, etc.) | Faulty Load Fixation and Fastener | Insufficient Lubrication of Buffers | Overriding of Buffers | Faulty Electrical Car Equipment | Insufficient Pantograph | Overhead Wire | Objects within the Clearance Gauge | Enlarged Width of the Track Gauge | Faulty Rail Surface | Faults inside Rail | Worn Rail | Broken Rail | Faulty Elastic Rail Pad | Faulty Rail Fastening / Homogeneous | Aged Timber Sleeper | Cracks in Concrete Sleeper | Insufficient Track Bed |
|-------|--------|-----------------------|--------------------------------|-------------|-------------|----------------------------------|---------------------------------|-------------|---------------------|---------------------------|----------------------------------|-------------------------------|-------------------------------|-------------------------|-----------------------------|-----------------------------|----------------|-----------------------------|--------------------------------|----------------|----------------|------------|----------|----------------|--------------------------|----------------|-------------------|------------|---------|----------------|--------------------------|----------------|-----------------|----------------|
### Wayside train monitoring systems

<table>
<thead>
<tr>
<th>Fault state</th>
<th>Detection system</th>
<th>Development category</th>
</tr>
</thead>
<tbody>
<tr>
<td>Hot bearings and brakes</td>
<td>Hot box detector</td>
<td>A</td>
</tr>
<tr>
<td>Flat and noncircular wheels</td>
<td>Dynamic scale, Flat wheel detector</td>
<td>A</td>
</tr>
<tr>
<td>Exceeding of railway loading gauge</td>
<td>Loading gauge detector</td>
<td>B / C</td>
</tr>
<tr>
<td>Wheel-, axle, wagon weight</td>
<td>Dynamic scale</td>
<td>A</td>
</tr>
<tr>
<td>Derailment</td>
<td>Derailment detector</td>
<td>B</td>
</tr>
<tr>
<td>Fire</td>
<td>Fire detector</td>
<td>B / C</td>
</tr>
</tbody>
</table>
Hot box detection system used in Austria
Required survey for data exchange

- Existence of train monitoring systems
- List of fault states, detected by these systems
  - Report „Axle Load Checkpoints“ by UIC
- Documentation of thresholds for different fault state recognition defined by national infrastructure managers
- Analysis of information chain and operational handling
- Verification of networking functionality
- Already implemented interfaces of an existing centre
Scenario 3

Checkpoint centre

Checkpoint operator

Sensor systems

Border train station

Austria

Neighbouring Country
Monitoring of indicators for operational safety is in accordance with existing TSI.

Moreover it will be required for CSI.

Benefit of wayside train monitoring is located in the networking functionality.

Costs of wayside train monitoring are related to the sensor systems.
Tip: Railway Signalling & Interlocking

Chapter 14
„Hazard Alert Systems“
written by A. Schöbel and D. Švalov