final

Joint Sector Program proposal (in regard to Step 1 of the ToR) for the ERA Task Force on wagon/axle maintenance

JSSG for ERA Task Force on wagon/axle maintenance
Viareggio
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1. The Joint Sector program improves axle maintenance even further

European wagons keepers have developed since many decades a maintenance system assuring a safety which allowed to become the most safe land freight transport.

However, after the tragic accident in Viareggio, the European Railway Agency, the European NSAs and the Joint Rail Freight Sector agreed to investigate in the frame of the ERA Task Force the possibilities for a European approach for harmonised criteria and immediate and mid-term measures ascertaining an even enhanced railway safety in an appropriate way, taking into account the expressed several requests for amendment.

1. The five important elements of the proposed program of the Joint Sector

1. A European program for Visual Inspections of the axles related to the risk domain operated in. Axles sorted out are brought to heavy maintenance including non destructive tests (NDT).

   Inspections are prioritized according to identified potential risk domains.

2. Thus a 30-40% higher number of NDT checks in normal heavy axle maintenance in the next years

3. Comparisons of the NDT results of “EVIC failed” and “EVIC passed” axles will be performed. Samples of axles from both states (passed/failed) taken from special traffics will be subject to NDT, analysed and also compared to results from heavy maintenance currently undertaken. According to the return of experience, the JSSG will propose the appropriate measures.

4. Measures for immediate and improved general traceability of wheelset / axle maintenance

5. First European Minimum Maintenance Criteria (e. g. for high performance operated type A axles including new wear limit, elimination of UIC category 4 surface roughness in heavy maintenance) => see separate document

2. Risk assessment: results of JSSG accident analysis

- fractures/population — 16 fractures (1994-2009)
  > 1.600.000 axles
  > 50.000.000.000 axle running kilometers/year*
- Type of wagon — wagons with potentially high loading factor or impact due to drop loading
- Type of axle — **no evidence for correlation:**
  - both type A and type B
  - no design problem (not in critical region, number of accidents, exper.)
- Age of axles — **no evidence for correlation:** age of fractured axles varies greatly
- Maintenance plan — **no evidence for correlation**
- NDT method — **no evidence for correlation**
- 21 t operation — **no evidence for correlation**
- Transported goods — maybe impact due to drop loading
- Surface conditions — corrosion should be considered

*30.000 km/year/wagon

2. Risk assessment: analysis of potential risk domains (I)

Risk domain	Findings / Measures
• Running gear design	**no evidence for correlation:** more or less equal conditions on the Continent (y 25, other running gears)
• Wheel wear	**no special risk:** high mileage vehicles are more often in maintenance
• Axle design/type of axle	**no evidence for correlation:** - no design problem (not in critical region, number of accidents, exper.) => 20t + 182 mm **as persistent urgent measure** to increase safety further *refer to JSSG document „UIC type A axle 20 t + high performance operation (overload) clarification“ for detailed information*
• Axle age	**no evidence for correlation:** axles are maintained on condition
• Damage from direct impact on the axle	=> EVIC: sorting out of mechanical damages (also implemented in GCU)
• Surface condition in heavy maintenance	=> sort out surfaces according to UIC category 4 in heavy maintenance

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2. Risk assessment: analysis of potential risk domains (II)

Risk domain	Findings / Measures	
• Corrosive conditions (vehicles transporting salt, potash, fertilizers,..)	=> EVIC „short“ (4 years) + more severe EVIC criteria (only cases A, B) => NDT analysis of samples („EVIC passed“ and „EVIC failed“ axles)	new
• Loading conditions	1) wagons with impact loading (e. g. clay, scrap) 2) wagons with high loading factor (e. g. bulk) => NDT analysis of samples („EVIC passed“ and „EVIC failed“ axles)	new
• Transported goods (dangerous / RID)	**no evidence for correlation;** considered due to potent. harm in case of hazard => EVIC „short“ (4 years) => NDT analysis of samples („EVIC passed“ and „EVIC failed“ axles)	new
• Wheel tread damage	**unknown impact** => few samples to be taken to NDT for analysis. General handling could be improved later by e.g. track-based monitoring	new
• Derailments	**unknown impact** => few samples to be taken to NDT for analysis	new

2. Risk assessment: analysis of potential risk domains (III)

Risk domain	Findings / Measures
• Axles in operation **not sorted out** in EVIC	Subject samples of axles to NDT that would have been o.k. („EVIC passed“) Results are compared with „EVIC failed “ axles + current heavy maintenance

=> NDT analysis program (on top of the volume undergone in normal heavy maintenance)

• **4 risk domains per NDT system**	1) corrosive environments 2) dangerous goods (RID) 3) high loading factor 4) impact due to drop loading
• **1000 axles x 2 states per risk domain**	1000 „EVIC passed“ + 1000 „EVIC failed“ axles to be taken **per risk domain**
• **3 NDT systems**	- „4 x 2 x 1000 axles“ analysis program to be executed **in each NDT system:** 1) Manual UT 2) Auto UT 3) MT (additionally, to discuss: MT+EDT) - results to be compared intra-NDT-system
• **Additional analysis**	few samples from 1) derailed axles 2) axles with wheel tread damage

2. Risk assessment: treatment of the samples from NDT analysis program

Valid for all axles from all NDT systems, all risk domains and for the „additional analysis“ axles:

- Identification of EVIC state and operating conditions of the wheelset (and wagon ID @ dismounting wheelset from wagon)
- NDT on full axle surface **before** surface treatment
- Surface treatment if required, according to the relevant heavy maintenance rules
- NDT on full axle surface **after** surface treatment (if required)

- Intra-NDT-system comparison of the results of „EVIC passed“ and „EVIC failed“ axles
- Intra-NDT-system comparison of the results with results from normal heavy maintenance

2. Risk assessment: current freight wagon wheelset heavy maintenance

- In Europe, over 1,6 million freight wheelsets/axles are operating (scope of JSSG investigation)
- Approx. 200.000 wheelsets / axles per year (11-13%) are maintained in heavy maintenance
- This leads to an average time for the overhaul of the entire axle population of approx. 8 years

- The axles maintained in heavy maintenance (with or without wheel change) are all subject to NDT procedures.

  The preliminary analysis of several railway and keeper maintenance data undergone in the JSSG work showed that the **rate of non admissible transverse defect indications or defects detected by NDT in the maintained axles is significantly lower than 1% of the total number.** These axles are treated or sorted out from service.

- In respect of this very low number of detected non admissible transverse defect indications or defects in Europe wide accepted checking technologies, the Sector is of the opinion that the existing applied heavy maintenance systems are working successfully.

3. Minimum Acceptance Criteria for axles in operation

The Joint Sector proposes, as outcome of the JSSG work and as harmonised common European rule, to accept all axles operating in the field that comply with the following conditions:

- **Outer** accepted state: according European Visual Inspection Catalogue (EVIC)
- **Inner** accepted state: according to the results achieved with the currently applied NDT procedures. Axles with detected (pre)cracks are sorted out in regular heavy maintenance

For assuring this, the European Visual Inspection Program has to be performed according to the boundary conditions and priorities presented on the next slides.

The axles sorted out in Visual Inspection are brought to heavy maintenance including NDT.

4. European Visual Inspection Program with risk based priorities and timeframes

The Visual Inspection (freight wagon axles, all types) application is prioritized according to the risk:

1 A 100% check of the axle population in operation with recommended priorities

The European freight wagon fleet will be subject to a Visual Inspection of the axle status with the goal:

- to sort out axles from operation according to the European Visual Inspection Catalogue (EVIC)
- to record a set of minimum data for the inspected axles
- to remove from service (immediately/after unloading) axles in a not admissible state and
- to hand over removed axles to heavy maintenance with appropriate treatment and NDT

2 Priorities and reduced timeframes

- Recommendation is given to the keepers to check visually with priority wagons with
  - high loading factor (e. g. 50%, F-, T-wagons)
  - impact due to drop loading (some E-types)
- Reduced time schedule (4 year) for the 100% check for wagons for
  - corrosive goods (salt, potash, fertilizers,…). Additionally, more restrictive visual check criteria apply.
  - dangerous goods (4 years timeframe for planned tank inspection acc.RID determines EVIC frame)

4. Boundary conditions for the application of the Visual Inspections

From three months after an ERA Task Force agreement on,

- all wagons
  - for dangerous goods (only RID tank wagons) and
  - operating under corrosive conditions

  will be checked under EVIC conditions to 100% in a **4 years** period

- All standard wagons will be checked under EVIC conditions to 100% in a **6 years** period

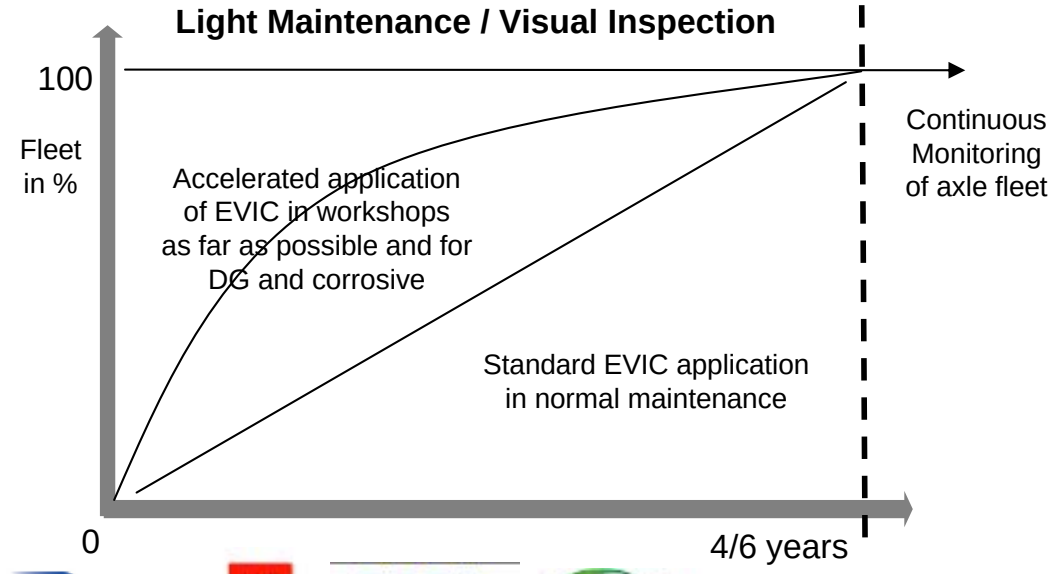
The expectation (not binding) for the dangerous goods fleet is a check to 90% already within 3 years.
The expectation (not binding) for the corrosive traffic fleet is a check to 100% already in 2 years.
The expectation (not binding) for the other wagons is is a check to 100% even before the 6 years period.

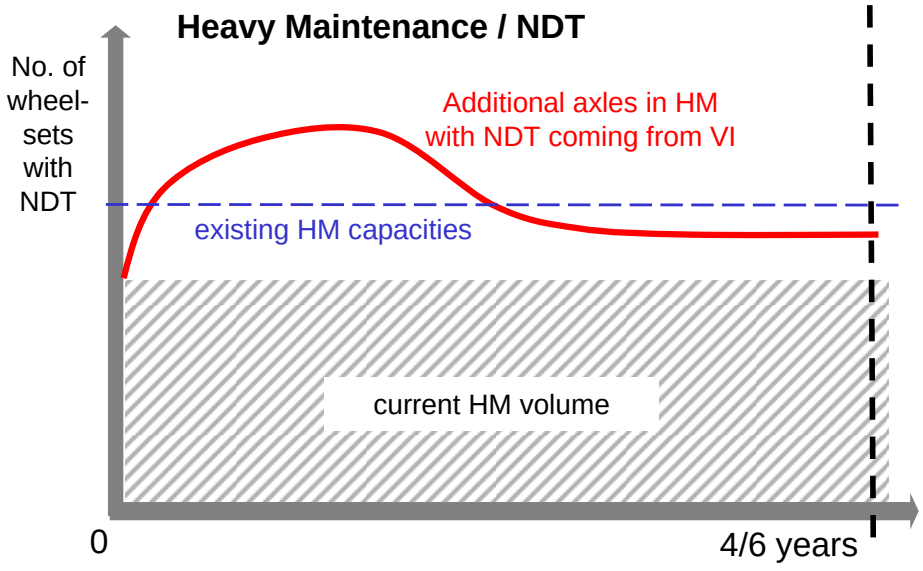
- In case of detection of faults, the wheelset will enter in heavy maintenance with NDT in accordance with the relevant maintenance systems.

- After having checked the fleet to 100%, the EVIC will be applied continuously and/or amended depending on the return of experience.

5. Volume effect of axles handed over to NDT due to Visual Inspections

- The application starts from the first time a wagon enters in planned revision or in a workshop for repair (where check is possible, on pits or lifting equipments). The results are recorded in a database.
- A proportion of up to 40% of the total fleet is expected to be checked visually within the first year. The number of axles inspected over years will so not be linear but accelerated.
- German sector experience shows that this will increase the number of axles
  - by 15-20% sorted out in light maintenance and handed over to heavy maintenance
  - up to 30-40% additionally in yearly heavy maintenance with NDT in comparison to now
- This additional yearly load will stress heavy maintenance capacities to the maximum





6. Improved traceability of the wheelset / axle maintenance

A lack of traceability in wheelset / axle maintenance actions is a weakness in railway maintenance architecture.

Even if a keeper is able at any time to provide the date of the last overhaul of the axle with the identification of the workshop (protocols are kept by the workshops), the Joint Sector nevertheless identified the following improvements:

- **Tracing of minimum data for the axles checked in the Visual Inspection**
- **Marking the visually inspected wheelsets/axles with a coloured dot** **to discuss**

- **Harmonised data recording in heavy maintenance**
- **Accessibility to web-based solution (e.g. VPI project) is offered by the Sector**

6. Improved traceability of the wheelset / axle maintenance

Logging the Visual Inspection results

After having performed the Visual Checks, the following data will be recorded:

- The ID and type of the wheelset and
- The date of the inspection
- In case of defects, the results of the inspection (according to the EVIC and GCU defect category)
- The workshop where the inspection has been performed
- A coloured dot will be applied to the wheel or sorted out axles are marked **(to be proposed by JSG)**

So, the number of wheelsets inspected, the number of axles sorted out and the reasons why are accessible. The fill-in of these data will increase with the EVIC application. These data allow RU/keepers to achieve return of experience.

Databases

The Sector will put in place, in the same time, more exhaustive database(s) with data formats incorporating the proposed informations (after alignment with ANSF and EBA requests).
Many of these informations are only available in overhaul of wheelsets or are not collectable (historical), so that the filling of such a base will request more time. The potential for centralization will be assessed.

6. Improved traceability of the wheelset / axle maintenance

Moreover, the Sector will collect for axle type A the following data in half the period planned for the 100% EVIC check (*other types: standard EVIC timeframe*):

- Maintenance action plan / relevant maintenance program (document number)
- (*Maintenance firm/plant : there is not a defined and only workshop for a wheelset*)
- Latest overhauling and next

The traceability of these (and others) data is given already today (e.g. written on the axle), but in general not in electronic databases.
The timeframe to integrate them in a database is aligned with the last communication from EBA that can be considered as a base for the harmonised ERA Task Force definition of european data formats.
Shorter terms are not compatible with the maintenance organization and capacity (even with the big improvements that are going to be introduced).

The “static” data will be collected during the next bearing overhaul:

- Manufacturing date -> static data
- Constructor -> static data
- Manufacturing standard (that is directly related to manufacturing date)

7. European training program for workshop staff and supervisors

As EN 473-1 doesn't handle with Visual qualification, the Sector will work out a European Training Program for the application of the EVIC with

- implementation / training plan (proposal: one day training, organized in different countries, depending on the language)
- provide the checking prescriptions in a procedure according EN 473 (draft done)

together with workshops and maintainers (january 2010)

Existing Examples:

- DB training Paderborn workshop (aug 2009) on surface admissible status in overhaul
- VPI training Delitzsch workshop (nov 2009) 240 participants from 10 member states
- Trenitalia trainings on corrosion Firenze (2) + Voghera (1) > 80 participants with Participation Certificate

The JSSG proposes to implement the ERA Task Force results as mandatory requirements in CMW (for subcontractors maintaining safety relevant components)

8. Implementation plan

- **Self obligation of the sector to apply ERA Task Force results**

- **Implementation of all ERA Task Force results in next revision of EN 15313 (asap)**

- **Proposal (to di uss later):**
  - annex to ECM ate:
    - obliga RA Task Force results
    - after fin ging with TF results: obligation to comply with EN 15313
      to define ha n requirements for freight wagon wheelset maintenance
      (no national stan

  - Obligation for keepers to use WS VIC application

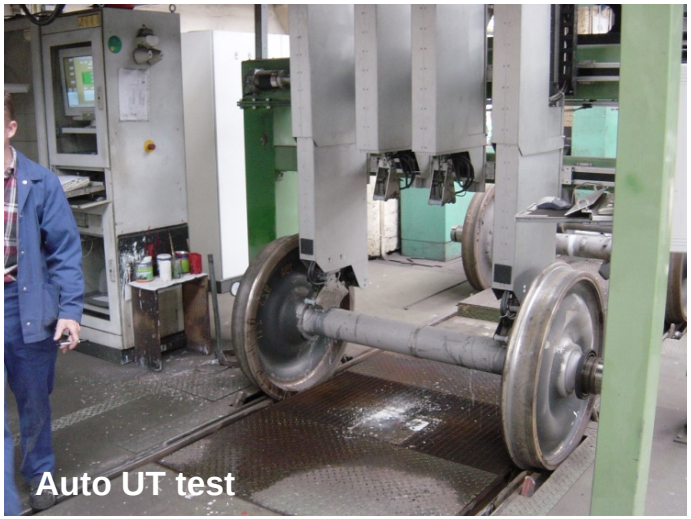
  - Consequences in case of non-application b ECM: withdrawal of ECM certificate?

To be discussed in a later stage

9. Improvement of wheelsets and axles maintenance in the past years


MT test


Turning


Auto UT test

The Sector reminds that, even in the past, there has been a continuous improvement in freight wagon axle maintenance (procedures, measures,...) in several railways and private wagon companies according to findings in maintenance or after incidents. The Sector has so always improved to prevent similar irregularities, but not in a harmonised European way.

Examples are the introduction of additional NDT after detection of corrosion, partially improved NDT technologies as Auto UT, MT, ECT, training programs, introduction of special conditions for corrosive traffics, partially shortening of the wheelset revision periods, additional treatments on the axles,…

9. Improvement of wheelsets and axles maintenance in the past years

Proper storage

Manual UT test

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Wagon Maintenance Services - Centrale werkplaats Gentbrugge
Brusselsesteenweg, 602 B-9050 Gentbrugge - België

Schouwblad en meetblad wielstellen

Domein	Bestand	Datum	Referentie	Versie	Blad
WAG10	DF.75.2000.N	01/05/2001	DF.75.2000.N	A	2 op 3

NIET DESTRUCTIEVE CONTROLE — COOLENS RUDY

Korrel wielas: *korrel OK*
Wielas NDC: *kant 1 en 2 goed*
US Wielband: *Niet van toepassing*
Magn. Wiellichaam: *kant 1 en 2 goed*
Interne spanning: *Niet van toepassing*
Controle sluitgroef:
Opmerkingen:

MEETBANK — DE RYCKE Ivan

Controle voor herstelling:
Controle na herstelling:
Soort herprofilering: *Volledig*

NUMMEREN - WIJZIGEN NUMMER

Oud Nr:
Nieuw Nr.: *850000186221*

CONTROLE ROLLAGERS — WITTERS Daniel

Merk lager: *SKF*
Astap: *kant 1 en 2 goed*
Kraagring: *kant 1 en 2 goed*
Tussenring: *kant 1 en 2 goed*
Aantal lagers afgenomen: *4*
Aantal lagers vervangen: *0*
Aantal binnenringen: *0*
Soort: *Gerecupereerd*
Type: *Tonnenlagerisferisch*

Data recording

Even the traceability of the wheelsets and axles (centralised databases,…) has already started in some companies. Additionally, most companies in the sector perform, in respect of their responsibility for safety, a certification / audit of the wheelset workshops (in different ways). An improvement of storage and handling of the wheelsets was done in parallel.

Thank you for your attention!