

JNS Normal Procedure

"Accident Gotthard base tunnel - broken wheels"

JNS report | version 5.0

ECM Working Instruction for the visual inspection of the component tread braked wheel

Version	Date	Comments
1.0	06.08.2026	

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1. General:

This "JNS visual inspection" in accordance to JNS 5.0 in context of measure 1.1 and 1.2 is a visual inspection of the component "tread-braked wheel" to ensure it is in proper condition. It aims to detect cracks in the tread, cracks in the rim and web, and any indications of thermal overload on the wheel.

The principles of EN 13018:2016 are taken into consideration. Furthermore, the JNS visual inspection requires the inspecting staff to possess a specific competence defined by the ECM, though an EN ISO 9712 qualification is not necessary.

The following document is an example for an inspection instruction which, in the view of the JNS Task Force, meets these general requirements and contains the minimum set of requirements and instructions. It can be adapted, if necessary, by the ECM function "Maintenance development". This working instruction shall be implemented by the ECM.

2. Scope of the visual inspection

Visual inspection* of the tread braked wheel during maintenance, to detect

- single cracks on the wheel tread
- cracks in rim and/or web
- any indication of thermal overload of the wheel

The wheel is inspected in the wheelset, with the wheelset installed in the vehicle or dismounted, inside or outside a workshop.

* Note: The check of the wheels is a visual inspection, not Visual Testing (VT) in accordance to EN ISO 9712. Certification of the inspection staff according to EN ISO 9712 is not required.

3. Reasons triggering visual inspection

If a wagon is treated by an ECM in- or outside of a workshop as described in measure 1.1 and 1.2:

- To fulfil the in-service limit requirement for the mileage interval
- During change of brake blocks in- or outside of workshops (except the rail wheel – contact)
- During axle inspections done in accordance with the European Visual Inspection Catalogue (EVIC) (see EN 15313, chapter 6.5.13.2)
- wagon heavy maintenance (revision)
- During off-vehicle maintenance
- If the ECM during wagon technical inspection gets aware of any indication of thermal overload of the wheel or thermal indications on the brake blocks (see Figure 1 to Figure 4) or after detected fixed brakes



Figure 1: Organic brake blocks: 'White layer' in the rubbing surface near to the surface area, up to 10mm thick, friction carbon deposits [UIC Leaflet e541-4, 3. Edition]



Figure 2: Organic brake blocks: 'Red layer' in the rubbing surface, up to 10mm thick [UIC Leaflet e541-4, 3. Edition]



Figure 3: Sintered brake blocks: White-blue layer' in the rubbing surface, up to 10mm thick [UIC Leaflet e541-4, 3. Edition]



Figure 4: All type of brake blocks: Crumbling of the rubbing surface, friction carbon deposits high, up to 10mm thick [UIC Leaflet e541-4, 3. Edition]

4. Field of application:

The inspection shall be applied for the entire circumference of the wheel. (Figure 5) = Tread surface + inner and outer side of web surface + inner and outer side of rim surface + Flange surface

Possible exception:

- Wheel-Rail Contact Area can be defined as a continuous arc of the tread, described by its central angle at the wheel centre α .
- Areas covered by the not-removed brake blocks

The application of the exception will be defined by the ECM in accordance to JNS report 5.0. in measure 1.2.

If the visual inspection of the whole circumference of the wheel cannot be applied, the mileage counter in accordance to measure 1.1 cannot set back to zero.

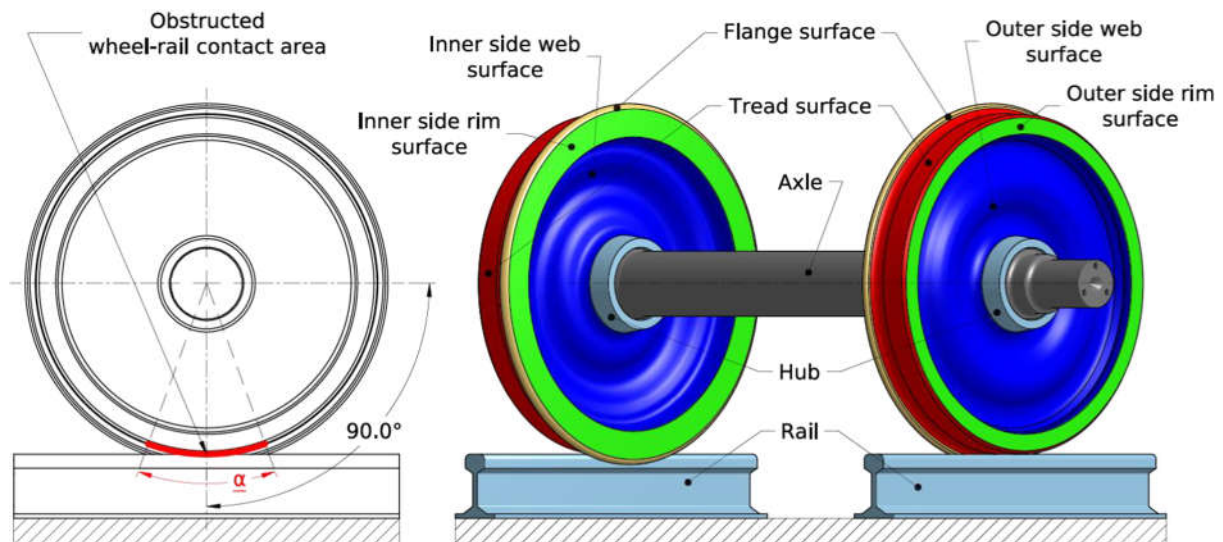


Figure 5: Inspection area of the wheels

5. Requirements for staff performing the inspection

The visual inspection shall be performed by staff which:

- is trained in application of the working instruction;
- is trained in the conditions of freight wagon wheelsets;
- has satisfactory vision for visual inspection.

The compliance of staff with these requirements shall be ensured and documented within the competence management of the ECM "Maintenance delivery function".

6. Inspection system and aids

The visual inspection must be carried out under normal maintenance conditions. The inspection is a direct visual inspection with the naked eye. If necessary, suitable lighting (e.g. hand lamp, sufficient to produce an illuminance of 500 lx on the inspection area) can be used. Suitable aids (e.g. mirrors) may be used to carry out a complete inspection of the circumference.

7. Preparation of the test object and the inspection surfaces

- If necessary, secure the wagon/ wheelset against unintended movement.
- Identify the wagon and the wheelset with the wheelset number
- If possible, make the inspection area accessible over the entire circumference.
- Remove coarse dirt from the inspection area. Coarse dirt is a volume-type deposit on the surface. (Caution: Clean only as far as necessary. The cleaning must not remove information relevant for the assessment, such as burned paint on the web.)

8. Performing the inspection, inspection sequence

Carry out the following steps for every wheel:

- Keep the viewing distance between the inspection area and the eye in a suitable distance of up to 600 mm.
- Keep the viewing angle not less than $\pm 30^\circ$ of the normal to the inspection area.
- Inspect the wheel over, search for
 - Single cracks (axial) on the tread,
 - radially oriented cracks at the rim side face
 - cracks in the web
 - bluish discoloration and for metal build-up
- Inspect the outer rim, search for cracks running from the tread over the rim edge.
- Inspect the web with focus on the area of the outer rim face, search for cracks and for burnt paint.

9. Evaluation of the inspection results, decision criteria

Assess every finding against the following criteria. The wheel is acceptable, provided that no inspection feature is present:

- Single cracks in the tread are not acceptable – see pictures in Figure 6.
- Cracks in the rim and/or in the web are not acceptable – see pictures in Figure 7 .
- signs of thermal overload on the wheel, like Burn-off of the thermally sensitive paint – see pictures



- Figure 8 and discoloration of the tread and metal build-up on the tread – see pictures Figure 9 are not acceptable.



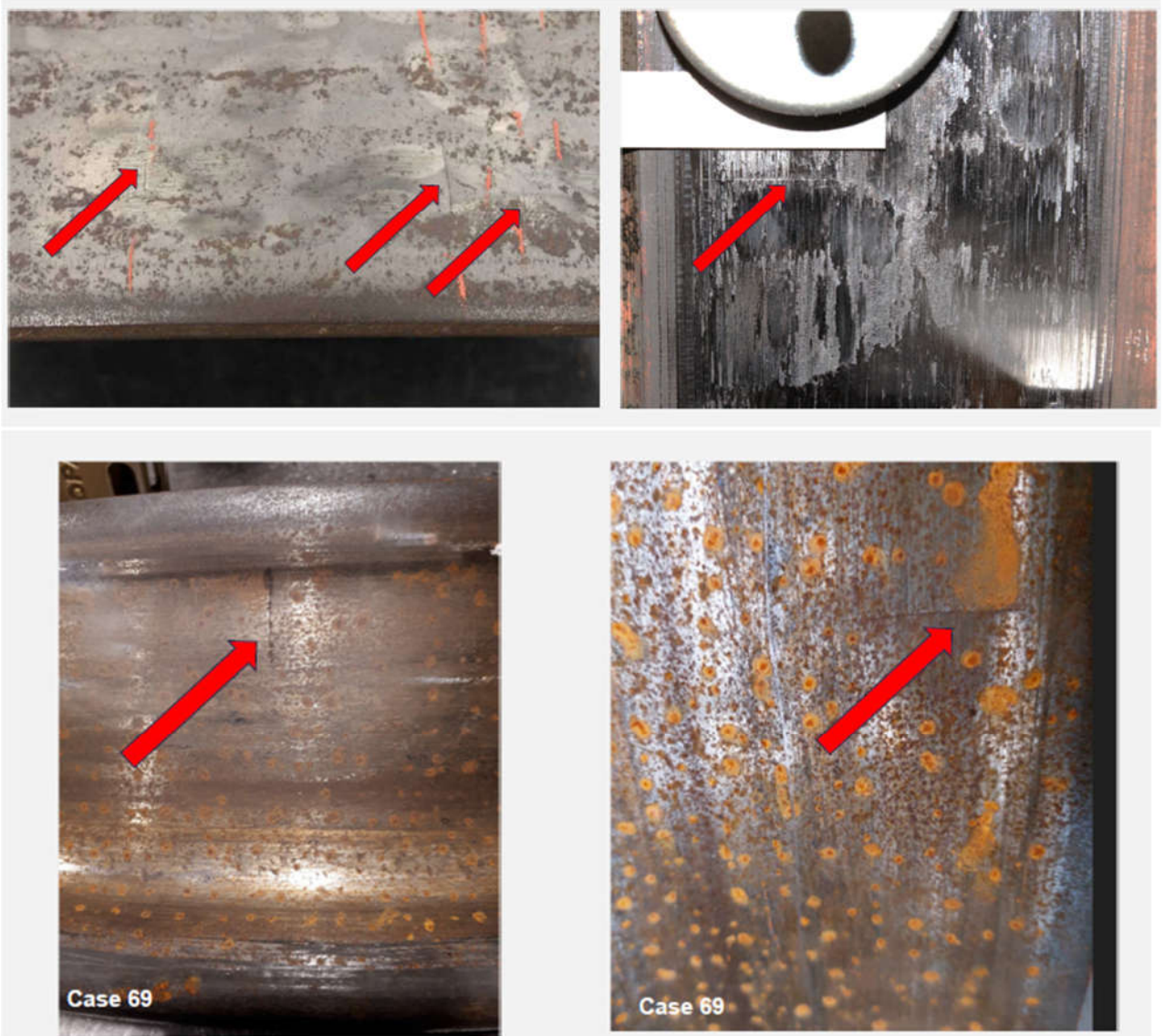


Figure 6: single cracks on the wheel tread

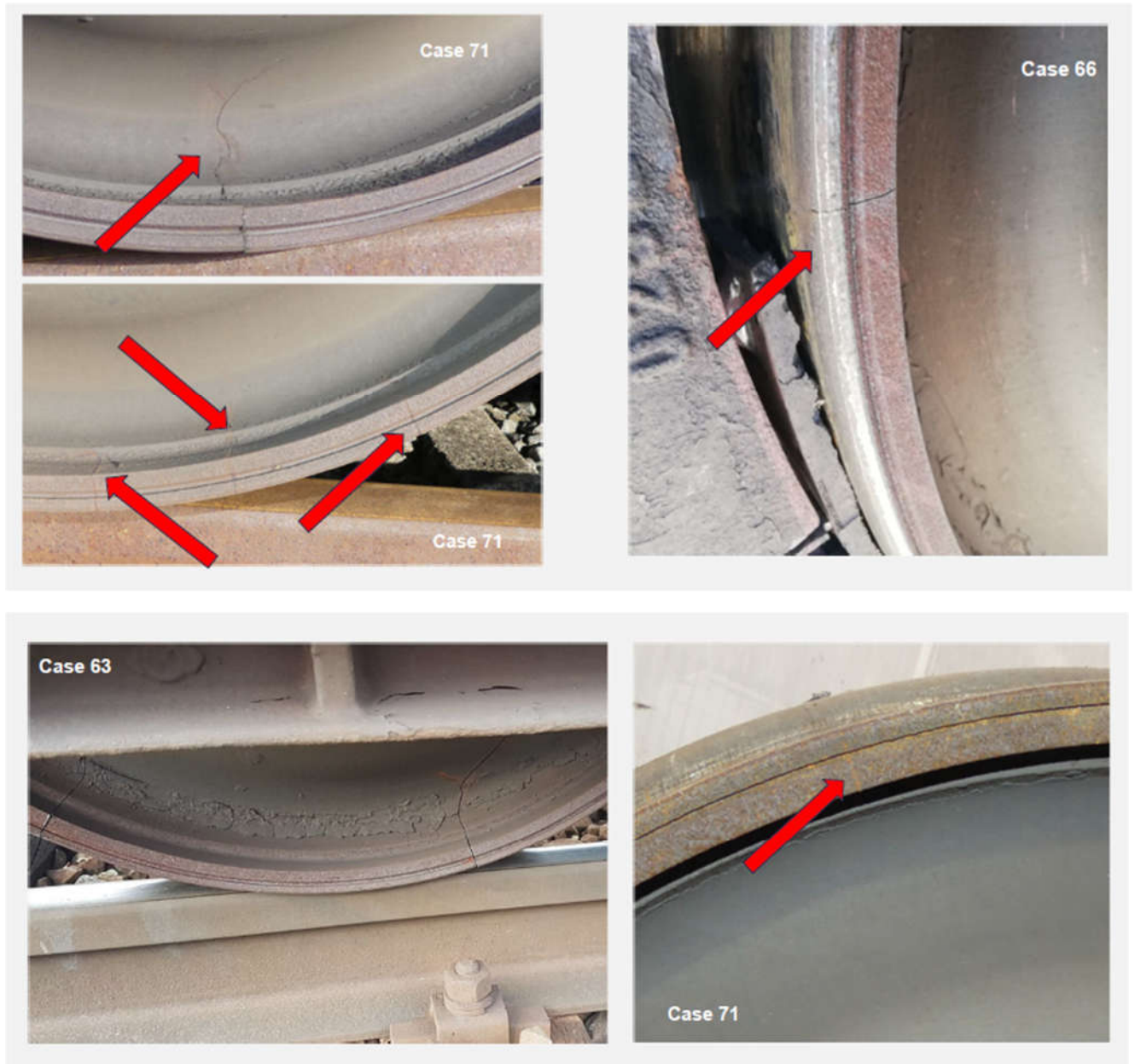


Figure 7: Cracks in the rim/ web

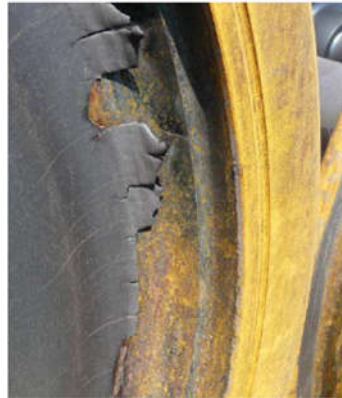


Figure 8: Signs of thermal overload of the wheel – burnt paint



Figure 9: Signs of thermal overload of the wheel - discolouration of the tread and metal build-up on the tread

10. Action after detection in the visual inspection

In case of any detections defined in the scope and chapter 9:

- dispatch wagon to workshop (if not already there)
- carry out extended measures during off-vehicle maintenance (measure 1.4, see JNS report 5.0)

11. Data collection

The result of the visual inspection shall be traceable for the individual wheelset with at least the following content:

- Date and location of inspection
- ECM "Maintenance delivery function" and name of the inspector
- Wheelset number and position of the wheel in the wagon (if applicable)
- inspected surface area (entire circumference or with exception rail/wheel contact and/or areas obstructed by not removed brake blocks)
- inspection result with the type of finding